CITY OF CERES

STANDARD SPECIFICATIONS AND DRAWINGS

2018

CITY OF CERES
ENGINEERING DEPARTMENT

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CHAPTER - 1

GENERAL PROVISIONS

1-1 DEFINITIONS AND TERMS

Wherever in these specifications the following terms are used (or in documents or instruments where these specifications govern) the intent and meaning shall be interpreted as provided in this section.

Working titles with a masculine gender, such as “workman” and “journeyman” and the pronoun “he” are used in these specifications and, for the sake of brevity, refer to all, regardless of gender.

AAPCC – American Association of Poison Control Centers

AASHTO – American Association of State Highway Transportation Officials

ACT OF GOD - A natural event, not preventable by any human agency, such as flood, storms, or lightning. Forces of nature that no one has control over, and therefore cannot be held accountable.

AGREEMENT - See Contract.

ASTM - American Society for Testing and Materials

AWWA - American Water Works Association

ADDENDA - Written or graphic instruments issued prior to the opening of bids which clarify, correct or alters the bidding documents. Also applies to contract documents.

BID - The offer of a proposal from a bidder, submitted on a City-approved form, setting the prices for the work to be performed.

BIDDER - Any individual, firm or corporation submitting a proposal for work, acting directly or through a duly authorized representative.

BIDDER’S GUARANTY - Cash, certified check, cashiers check or bond submitted by a bidder as a guaranty that the bidder will enter into a contract with the City of Ceres for work, if awarded to the bidder.

BOND (SURETY) - A bond issued by an entity on behalf of a second party, guaranteeing that the second party will fulfill an obligation or series of obligations to a third party. In the event that the obligations are not met, the third party will recover its losses via the bond.

BID BOND - A bid bond is one which provides financial assurance that the bid has been submitted in good faith, and that the contractor intends to enter into the contract at the price bid and provide the required performance and payment bonds.

MAINTENANCE BOND - A maintenance bond is one which normally guarantees against defective workmanship or materials for a specified period.

PAYMENT BOND - A payment bond is one which guarantees that the contractor will pay certain subcontractors, laborers, and material suppliers associated with the project.

PERFORMANCE BOND - A performance bond is one which protects the owner from financial loss should the contractor fail to perform the contract in accordance with its terms and conditions

SUBDIVISION BOND - A subdivision bond is one which guarantees to a city, county, or state that the principal will finance and construct certain improvements such as street, sidewalks, curbs, gutters, sewer, and drainage systems.

CASQA – California Storm Water Quality Association

CHANGE ORDER - A document which is signed by the Contractor and the City and authorizes an addition, deletion or revision in the work, with possible adjustment in the contract price or the contract time, issued on or after the effective date of the Contract.

CITY - City of Ceres, California, employees acting either directly or through properly authorized agents acting within the scope of the particular duties assigned to them.

CITY ENGINEER - City Engineer, City of Ceres, acting either directly or through properly authorized agents acting within the scope of the particular duties assigned to them.

CITY STANDARDS - The Standard Specifications of the City of Ceres, Community Development Department, Engineering Division.

CA MUTCD - California Manual on Uniform Traffic Control Devices

CONTRACT - The written agreement covering the performance of the work and the furnishing of labor and materials in the construction of the work.

CONTRACTOR - The person or persons, partnership or corporation, private or municipal, who have entered into a contract with the City of Ceres.

COUNCIL - The City Council of the City of Ceres

DAYS - Days shall mean calendar days unless otherwise specified.

DEFECTIVE - An adjective which when modifying the word Work refers to work that is unsatisfactory, faulty of deficient, or does not conform to the contract plan and specifications, or does not meet the

requirements of any inspection, reference standard, test or approval referred to in the contract plans and specifications, or has been damaged prior to the City Engineers' recommendations of final payment.

DEPARTMENT OF COMMUNITY DEVELOPMENT - Community Development Department of the City of Ceres

DIRECTOR OF PUBLIC WORKS - The Director of Public Works of the City of Ceres acting either directly or through properly authorized agents acting within the scope of the particular duties assigned to them.

EASEMENTS - A recorded document in which the land owner gives the City permanent rights to construct and maintain water mains, sanitary sewers, storm drains and/or facilities across private property.

EMERGENCY - An emergency is a situation which poses an immediate risk to health, life, property or environment. In order to be defined as an emergency the incident should contain one or more of the following: a) immediately threat to life, health, property or environment, b) have already caused loss of life, health detriments, property damage or environmental damage or c) have a high probability of escalating to cause immediate dangers to life, health, property or environment.

ENGINEER - See City Engineer

HOLD HARMLESS - Agreement by one party to indemnify and defend a second party when the second party is sued by a third party as a result of the first party's actions or omissions.

ITE – Institute of Transportation Engineers

LIQUIDATED DAMAGES - The amount of dollars assessed for each and every calendar day required to complete the contract in excess of the contract time.

NCPI – National Clay Pipe Institute

NEC - National Electric Code

NEMA - National Electric Manufacturer's Association

PIPE CROWN – Exterior apex of a pipe.

PLANS - The official plans, typical cross-sections, general cross-sections, working drawings and supplemental drawings, or reproductions thereof, which show the location, character, dimensions and details of the work to be done, and which are to be considered as a part of the contract supplementary to these specifications.

PROCEDURES MANUAL – City of Ceres Procedures Manual

PROPOSAL - The offer of the bidder for the work when completed and submitted on the prescribed proposal form, properly signed, and guaranteed.

PROPOSAL FORM - The approved form on which the City of Ceres requires formal bids to be prepared and submitted for the work.

REFERENCE SPECIFICATIONS - Those standards, rules, method of tests or analysis, codes, and specifications of other agencies, engineering societies, or industrial associations referred to in the contract documents. These refer to the current edition of amendments in effect at the time of advertising the project unless specifically referred to by edition, volume or date.

SHOP DRAWINGS - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by the Contractor to illustrate material or equipment for some portion of the Work.

SPECIAL PROVISIONS - Specific clauses of the project specifications setting forth conditions or requirements peculiar to the particular work called for by the plans and specifications.

SPRING LINE – Spring line of a pipe. In a transverse cross section of a pipe the line of maximum horizontal dimension.

STANDARD DETAILS - City of Ceres Standard Details depicting standard construction of the various items of work indicated and/or referred to on plans, specifications, and special provisions.

STANDARD SPECIFICATIONS - City of Ceres Standard Specifications (also “these specifications”)

STATE - State of California

STATE STANDARD PLANS - The Standard Plans of the State of California, Department of Transportation

STATE STANDARD SPECIFICATIONS - The Standard Specifications of the State of California, Department of Transportation

SUPERINTENDENT - The executive representative of the Contractor present on the project at all times during progress, authorized to receive and fulfill instructions from the City Engineer.

SURETY - Any individual, firm or corporation, bound with and for the Contractor for the acceptable performance and completion of the work and the satisfaction of all obligations incurred.

SURVEYOR - A land surveyor licensed in the State of California.

TESTING AGENCY - The commercial laboratory approved by the City Engineer to test materials involved in the contract.
UL – Underwriters Laboratories, Inc

AWARD AND EXECUTION OF CONTRACT

1-2.01 GENERAL TERMS

The intent of the Contract is to describe a functionally complete Project (or part thereof) to be constructed in accordance with the contract documents. Work, materials or equipment that may reasonably be inferred from the contract documents as being required to produce the intended result shall be supplied whether or not specifically called for. Words which have a well-known technical or trade meaning used to describe the work, materials or equipment shall be interpreted in accordance with that meaning unless otherwise qualified by the contract documents. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference is specific or implied, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of bids (or, on the effective date of the agreement if there were no bids), except as may be otherwise specified. Provisions of referenced standard specifications, manuals or codes shall not change the duties and responsibilities of the City, contractor or engineer, or any of their consultants, agents or employees of any duty or authority of supervising or directing the work. Clarifications and interpretations of the contract documents shall be issued by the City Engineer.

1-2.02 AWARD OF CONTRACT

A. Notice of Award

The City reserves the right to reject any and all proposals. The award of the contract, if awarded, will be to the lowest responsible bidder whose proposal complies with all of the requirements prescribed. Awards will be announced within 60 days after the opening of the proposals. All bids will be compared on the basis of an engineer's estimate of the quantities of work to be done.

B. Bid Alternates

Whenever additive or deductive items are included in a bid, the special provisions shall specify the method that will be used to determine the lowest bid. In the absence of such a specification, the following method will be used:

1. The lowest bid shall be determined in a manner that prevents any information that would identify any of the bidders or proposed subcontractors or suppliers from being revealed to the City before the ranking of all bidders from lowest to highest has been completed.

2. In the event the bids are inadvertently opened in a manner that discloses the identity of the bidders prior to determining which bid alternates shall be awarded for the project the following method shall be used to determine the lowest bid:

The lowest bid shall be the lowest total of the bid prices on the base contract and those items that, when added to or subtracted from the base contract, are less than or equal to the amount budgeted for the project.

A responsible bidder who submitted the lowest bid as determined by this section shall be awarded the contract, if it is awarded. This section does not preclude the City from adding to or deducting from the contract any of the additive or deductive items after the lowest responsible bidder has been determined.

C. Delivery of Signed Contract, Project Bonds, Insurance

Within ten working days of the date of receipt of the Notice of Award, the Contractor shall obtain and deliver the required project bonds and insurance and return two copies of the signed contract to the City. If the information is not supplied to the City within the ten working day requirement then the Contractor forfeits rights to the contract and the contract may be awarded to the next lowest responsible bidder at the discretion of the City.

D. Notice to Proceed

A preconstruction meeting shall be held prior to starting any work on the project. The City will contact the Contractor within five working days from the date the contract is signed by the City to schedule the preconstruction meeting. The preconstruction meeting shall be held no later than ten working days from the contract signing date. The Notice to Proceed shall be issued at the preconstruction meeting.

E. Commencement of Work

Work shall commence as soon as practicable (or as specified in the contract documents) from the date of the Notice to Proceed and shall be diligently prosecuted to completion within the time provided in the special provisions. Work shall not commence until contract bonds and insurance certificates have been filed with the City and the contract has been signed by the City.

F. Return of Bidder's Guaranty

The proposals of the two lowest bidders will be considered in awarding the contract. All other proposal guarantees will be returned to the bidders after tabulation of the bids has been made. Proposal guarantees will be returned after the successful bidder has executed the contract and the contract bonds are approved and filed.

1-2.03 CONTRACT BONDS

The Contractor shall furnish two surety bonds in the amount and for the purpose specified below. The bonds shall be issued by entities duly and legally licensed in the State of California. Entities

that the City will accept bonds from are only those listed in the latest edition of the publication titled "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds" published by the U.S. Department of the Treasury. Bonds shall be furnished and maintained at the expense of the Contractor for and during the entire life of the contract.

Pursuant to California Civil Code §3248, the successful bidder shall furnish to the City at the time of execution of contract, a payment bond in an amount equal to one hundred percent of the contract price. The successful bidder shall also furnish to the City, at the time of execution of the contract, a faithful performance bond in an amount equal to one hundred percent of the contract price.

All alterations, extensions of time, extra and additional work, and other changes authorized by these specifications or any part of the contract may be made without securing the consent of the surety or sureties on the bonds.

1-2.04 EXECUTION OF CONTRACT

The contract shall be signed by the successful bidder and returned, together with the contract bonds and insurance certificates, within ten working days after the bidder has received notice that the contract has been awarded. Any proposal shall not be binding upon the City until the contract has been executed and returned to the City and the bonds and insurance certificates have been filed with the City.

Failure to execute and return the contract and to file the required bonds and insurance within ten working days after the bidder has received notice that the contract has been awarded shall be cause for the annulment of the award and the forfeiture of the proposal guaranty to the City.

Upon the failure or refusal of the successful bidder to execute and return the contract, bonds and insurance, the contract may be awarded to the second lowest responsible bidder. Should this contractor fail or refuse to execute and return the contract and required bonds and insurance, the contract may be made to the third lowest responsible bidder. On the failure or refusal of the second or third lowest responsible bidders to whom the contract is awarded to execute the contract and file acceptable bonds and insurance, the bidders' guarantees shall be forfeited to the City.

1-2.05 SUBCONTRACTORS

A. Nothing in this Section limits or diminishes any rights or remedies, either legal or equitable, which:

1. An original or substituted subcontractor may have against the Prime Contractor, his or her successors or assigns

2. The City may have against the Prime Contractor, his successors or assigns, including the right to take over and complete the contract.

B. Each bidder for the work specified shall set forth in the space provided in the proposal form of his bid:

1. The name and the location of the place of business of each subcontractor who will perform work or labor or render service to the Prime Contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under a subcontract to the Prime Contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of 0.5% of the Prime Contractor's total bid or $10,000, whichever is greater.

2. The portion of the work which will be done by each subcontractor. The Prime Contractor shall list only one subcontractor for each such portion as is defined by the Prime Contractor in his bid.

   If a Prime Contractor:

   a. fails to specify a subcontractor

   b. specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of 0.5% of the Prime Contractor's total bidthen the Prime Contractor agrees that he is qualified to perform that portion and that he shall perform that portion himself. If the contractor's bid is accepted then:

   a. he shall not be permitted to subcontract any portion of the work which he is required to perform himself, or

   b. to substitute any person as subcontractor in place of the subcontractor listed in the original bid, or

   c. to permit any subcontract to be voluntarily assigned or transferred, or

   d. allow any subcontract it to be performed by anyone other than the original subcontractor listed in the original bid, except under the conditions set forth below:

   The Contractor agrees that he is as fully responsible to the City for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as the Contractor is for the acts and omissions of persons directly employed by him. The City will deal directly with, and make all payments to, the Contractor only.

   The Contractor shall be responsible for the coordination of all trades, subcontractors, and suppliers required for the work. The City will not settle any differences between the Contractor and his subcontractors, or between subcontractors.

When the subcontracted work is not being performed in a manner satisfactory to the City, the City shall provide the contractor with written notification to take corrective action within a specified time. If correction is not made within that time then the subcontractor shall be removed from the work and shall not be reemployed on the work.

Nothing contained in the contract documents shall create any contractual relationship between any subcontractor and the City.

C. A Prime Contractor whose bid is accepted may not:

1. Substitute a subcontractor in place of the subcontractor listed in the original bid, except that the City may consent to the substitution of another subcontractor in any of the following situations:

   a. When the subcontractor listed in the bid, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when that written contract, based upon the general terms, conditions, plans and specifications for the project involved or the terms of the subcontractor's written bid, is presented to the subcontractor by the Prime Contractor.

   b. When the listed subcontractor becomes bankrupt or insolvent.

   c. When the listed subcontractor fails or refuses to perform his or her subcontract.

   d. When the listed subcontractor fails or refuses to meet the bond requirements of the Prime Contractor.

   e. When the Prime Contractor demonstrates to the City, subject to the further provisions set forth in this Section, that the name of the subcontractor was listed as the result of an inadvertent clerical error. The Prime Contractor shall provide written notice to the City and to the subcontractor.

   f. When the listed subcontractor is not licensed pursuant to the Contractors License Law or does not have the proper category of license to undertake the contracted work.

   g. When the City determines that the work performed by the listed subcontractor is unsatisfactory and not in compliance with the plans and specifications, or that the subcontractor is substantially delaying or disrupting the progress of the work.

   h. When the listed subcontractor is ineligible to work on a public works project pursuant to §1777.1 or §1777.7 of the Labor Code.

i. When the City determines that a listed subcontractor is not a responsible contractor.

Prior to approval of the Prime Contractor's written request for the substitution the City shall give notice in writing to the listed subcontractor of the Prime Contractor's request to substitute and the reasons for the request. The notice shall be served by certified or registered mail to the last known address of the subcontractor. The listed subcontractor who has been so notified shall have five working days to submit written objections to the City. Failure to submit these written objections shall constitute the listed subcontractor's consent to the substitution. If written objections are submitted then the City shall give notice to the listed subcontractor of a hearing by the City on the Prime Contractor's request for substitution.

If affidavits are filed by both the Prime Contractor and the intended subcontractor but the listed subcontractor has, within six working days from the time of the prime bid opening, submitted to the City and to the Prime Contractor written objection to the Prime Contractor's claim of inadvertent clerical error then the City shall investigate the claims of the parties and shall hold a hearing as provided in this Section to determine the validity of those claims. Any determination made shall be based on the facts contained in the declarations by all parties. The City may, on its own motion or that of any other party, admit testimony of other contractors, any bid registries or depositories, or any other party in possession of facts which may have a bearing on the decision of the City.

D. Subletting or subcontracting of any portion of the work in excess of 0.5% of the Prime Contractor's total bid shall only be permitted in cases of public emergency or necessity, and only after a finding by the City setting forth the facts constituting the emergency or necessity.

E. Circumvention by a general contractor who bids as a Prime Contractor of the requirement under this Section to list his subcontractors, by the device of listing another contractor who will in turn sublet portions constituting the majority of the work covered by the Prime Contract, shall be considered a violation of this Section and shall subject that Prime Contractor to the penalties set for in this Section.

F. A Prime Contractor who violates any of these provisions is at risk of violating his contract and the City may cancel the contract or assess the Prime Contractor a penalty in an amount of not more than 10% of the amount of the subcontract involved. The funds recovered through the application of this penalty shall be deposited in the fund out of which the Prime Contract is awarded.

G. The Prime Contractor is prohibited from work on a public works project with a subcontractor who is ineligible to work on the public works project pursuant to §1777.1 and §1777.7 of the Labor Code.

1-2.06 RELIEF OF BIDDER

A bidder shall not be relieved of the bid unless by consent of the City nor shall any change be made in the bid because of mistakes, errors or omissions by the bidder.

If the City consents to relieve a bidder of a bid because of a mistake then the City Engineer shall prepare a report that documents the facts establishing the existence of each element required by this Section. The report shall be available for inspection as a public record.

The bidder shall establish to the satisfaction of the City Engineer that:

a. a mistake was made

b. he gave the City written notice within five days after the opening of the bids specifying how the mistake occurred

c. the mistake made the bid materially different than the bidder intended it to be

d. the mistake was made in filling out the bid and not due to error in judgment or to carelessness in inspecting the site of the work, or in reading the plans or specifications.

A bidder who claims a mistake or who forfeits his bid security shall be prohibited from participating in further bidding on the project on which the mistake was claimed or the security forfeited.

NATURE OF CONTRACT / CHANGES IN WORK

1-3.01 ALTERATIONS

By mutual consent in writing of the parties signatory to the contract, alterations or deviations, increases or decreases, additions or omissions to the plans and specifications may be made and the same shall in no way affect or make void the contract. The agreement and execution of change orders shall be performed by both parties in an expeditious manner so as not to unduly delay the project.

1-3.02 LIMITED CITY POWER

The Contractor recognizes that the City is a public agency and that it can act only through its duly authorized agents, and in this regard agrees that only written change orders, executed as specifically authorized by the governing body of the City either directly or through properly authorized agents, are valid. The project consultants do not have the authority to issue a change order unless authorized by the City in writing. Oral change orders are not authorized in any circumstance. Unless a valid change order is issued all changes in the work performed by the Contractor shall be at his own risk and he shall not be entitled to any additional compensation on account thereof and he may be required to make the work conform to the project design and construction documents. No act or series of acts by the City during the course of the contract shall be deemed to constitute a waiver of the right of the City to rely upon the provisions of this subparagraph.

1-3.03 CHANGES IN WORK

A. Changes in Accordance with Project Specifications: Each change order shall be performed in accordance with the project specifications. In case of conflict between the project specifications and the change order the City Engineer will select the alternative.

B. Changes Requested by the Contractor: Changes in the plans and specifications, requested in writing by the Contractor, which do not materially affect the work and which are not detrimental to the work or to the interests of the City, may be granted to facilitate the work, when approved in writing by the City Engineer.

If changes are granted then the changes shall be made at a reduction in cost or at no additional cost to the City. Nothing herein shall be construed as granting a right to the Contractor to demand City acceptance of any change.

1-3.04 CONTRACT ITEMS

The quantities shown in the Proposal Form are derived from the engineer's estimate of the work to be performed under the contract. Payment for the individual items will be based upon the actual

work completed. Increases or decreases in the quantity of a contract item of work will be determined by comparing the total pay quantity of that item of work with the engineer's estimate.

If the total pay quantity of any item of work required under the contract varies from the engineer's estimate by 25% or less then payment will be made for the quantity of work of the item performed at the contract unit price. Whenever contract items increase or decrease in quantity by more than 25%, the addition or subtraction from the contract price shall be established in accordance with §4-1.03 of the State Standard Specifications.

1-3.05 EXTRA WORK

New and unforeseen work is classified as extra work when the work cannot be covered by any of the various items, or combination of items for which there is a bid price. If extra work orders are given then the work shall be considered a part hereof.

The Contractor shall do no extra work except upon written order from the City Engineer. For extra work the Contractor shall receive payment as previously agreed upon in writing, or he shall be paid on a force account basis.

In case of neglect or refusal by the Contractor to perform any extra work which may be authorized by the City, or to make satisfactory progress in the execution of the same, the City may perform the work and the Contractor shall not obstruct, interfere with, or molest the person completing the work.

1-3.06 GUARANTEE

Except as otherwise provided for in the project specifications, and excepting only items of routine maintenance, ordinary wear and tear and unusual abuse or neglect, the Contractor guarantees all work executed by him and all supplies, materials and devices of whatsoever nature incorporated in, or attached to the work, or otherwise delivered to the City as a part of the work pursuant to the Contract, to be absolutely free of all defects of workmanship and materials for a period of one year after final acceptance of the entire work by the City Council. The Contractor shall, at the discretion of the City Engineer, either repair or replace any or all such work or material, together with all or any other work or material which may be displaced or damaged in so doing, that may prove defective in workmanship or material within the one year guarantee period without expense or charge of any nature whatsoever to the City. If repairs or replacement are required, the repaired items will be guaranteed free of defects for an additional year from the date of City acceptance of the repairs or replacement work.

In the event that the Contractor fails to comply with the conditions of the foregoing guarantee within ten calendar days after the date of written notification of the defect, the City shall have the right, but shall not be obligated to repair, or obtain the repair of, the defect and the Contractor shall pay to the City on demand all costs and expenses associated with the repair. Notwithstanding anything herein to the contrary, if any defect in workmanship or material covered by the foregoing guarantee results in an immediate hazard to the health or safety of any person or any property then the City shall have

the right to immediately repair, or cause to be repaired, such defect, and the Contractor shall pay to the City on demand all costs and expense of the repair. The foregoing statement relating to hazards to health, safety or property shall be deemed to include either temporary or permanent repairs which may be required as determined by the sole discretion and judgment of the City Engineer.

1-3.07 DISPUTED WORK

If the Contractor and the City Engineer are unable to reach agreement on disputed work then the City Engineer may direct the Contractor to proceed with the work.

Although not to be construed as proceeding under extra work provisions, the Contractor shall keep and furnish records of disputed work in accordance with the specifications.

CONTROL OF WORK

1-4.01 AUTHORITY OF THE CITY ENGINEER

The City Engineer shall answer any and all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the performance and the rate of progress of the work. The City Engineer shall answer all questions which arise as to the interpretation of the plans and specifications; all questions as to the acceptable fulfillment of the contract on the part of the Contractor; and all questions as to claims and compensations.

Any decision by the City Engineer shall be final and he shall have the authority to enforce and make effective his decisions and orders.

1-4.02 PLANS AND SPECIFICATIONS

The Contractor shall keep at the worksite a copy of the approved plans and specifications, to which the City Engineer shall have access to upon request.

The approved plans, specifications and other contract documents will govern the work. Standard specifications and standard details which are referenced in the drawings or specifications are a part of the contract documents.

While the City has endeavored to accurately represent the conditions which may affect the cost of the proposed work shown on the plans or indicated in the specifications, the City does not warrant the completeness or accuracy of such information. The Contractor has the responsibility to ascertain the existence of all conditions affecting the cost of the work.

Tests, investigations, statements or estimates of factual situations not incorporated in the contract shall not be relied on by the Contractor. Any test, investigation, statement or estimate of fact incorporated in the contract shall be verified by the Contractor, at his expense, to be a suggestive only. The Contractor may request access to the background information and shall develop his own opinion concerning the reliability or accuracy of conclusions appearing in the contract.

The Contractor may not rely on "Record Drawings" or other accepted drawings or maps to be accurate representations of field conditions. Actual locations and depths shall be determined by field investigations by the Contractor at his expense.

General and special provisions apply with equal force to all the work, including extra work authorized. In the case of conflict between the documents, the special provisions shall govern.

For convenience, these Specifications are arranged in several sections; these arrangements shall not be considered as the limits of the work required of any separate trade. The terms and conditions of such limitations are wholly between the Contractor and his subcontractors.

In general, the drawings will indicate dimensions, position and type of construction, and the specifications will indicate qualities and methods. Work not particularly detailed, marked or specified, shall be as similar to parts that are detailed, marked or specified.

All work shall conform to the approved plans, special provisions and specifications.

Approval by the City of the plans does not relieve the Contractor of any responsibility for accuracy and detailing. The Contractor shall be responsible for agreement and conformity of his working plans with the approved plans and specifications.

1-4.03 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS

Finished surfaces in all cases shall conform to the dimensions shown on the approved plans. Deviations from the approved plans shall be determined by the City Engineer and authorized in writing.

1-4.04 COORDINATION OF PLANS, SPECIFICATIONS AND SPECIAL PROVISIONS

Prior to the start of construction and during the review of the contract plans, special provisions, or project specifications, the Contractor and each of his subcontractors shall make a written report to the City describing any conflicts, deficiencies, errors or omissions detected.

During construction, if errors, omissions, conflicts or discrepancies are detected then the Contractor shall report them to the City and obtain written instructions that resolve the deficiencies prior to proceeding with the affected work.

If the Contractor proceeds with any portion or phase of construction which is incorrectly indicated in the contract plans or documents the he shall be responsible for any corrective measures required to make repairs or adjustments without additional time or compensation.

These specifications, and the project plans, special provisions, and all supplementary documents are essential parts of the contract and a requirement occurring in one is as binding as though occurring in all.

Project plans shall govern over Standard Details; Standard Details and project plans shall govern over these Specifications; and the special provisions shall govern over these specifications and the project plans. The City Standard Specifications, Standard Details, and project plans and special provisions shall govern over the State Standard Specifications and the State Standard Plans.

Order of Governance:

1. Project Special Provisions
2. Project Plans and Details
3. City of Ceres Standard Specifications

4. City of Ceres Standard Details
5. State Standard Specifications
6. State Standard Plans

A. INTERPRETATION OF PLANS AND SPECIFICATIONS

In case of conflict between plans and specifications:

The specifications control quality, materials and installation requirements.

The plans control size, location and quantity.

Should it appear that the work to be done, or any matter relative thereto, is not sufficiently detailed or explained in the specifications, plans and the special provisions, the Contractor shall apply to the City for such further explanations as may be necessary and shall adhere to the explanations or interpretations as part of the contract. In the event of any discrepancy between any drawing graphics and their alpha-numerics, the alpha-numerics shall be taken as correct.

B. PRE-CONSTRUCTION MEETINGS

A preconstruction meeting shall be held prior to commencing work. The City shall designate a date and time for a preconstruction meeting.

Prior to commencing work and at any time during the progress of the work, the City shall have the authority to call meetings with the Contractor and any of his employees or subcontractors on the project as deemed necessary to discuss details of construction or interpretation of contract documents. Additional compensation for attendance at these meetings shall not be provided.

C. HOURS OF WORK

1. Normal Work Hours (Pacific Standard Time)

   Normal work hours are between 7:00 AM and 5:00 PM excluding Saturdays, Sundays and legal holidays. Work performed during hours and /or on days other than specified above shall be at the discretion of the City. If permission is granted, the Contractor shall bear all additional expenses of the City's personnel and inspection services created by changes to the normal work hours.

2. Traffic Control-Signal System Shutdowns

   Signal system shutdowns shall occur only between the hours of 9:00 AM and 3:00 PM. Contractors working on signals outside these hours shall pay a signal system shutdown penalty.

Signal System Shutdown Penalty: The Contractor shall pay to the City the sum of $250 per hour, or fraction of hour thereof, of signal system shutdown before 9:00 AM and after 3:00 PM. The Contractor agrees to pay this sum; in cases where the penalty is not paid, the Contractor agrees that the City may deduct the amount from any payment due to the Contractor under the contract.

The Signal System Shutdown Penalty as provided for herein may be waived by the City if the Contractor installs a temporary traffic signal.

The installation of a temporary traffic signal system by the Contractor requires written authorization from the City. Prior to installation, the Contractor shall submit an equipment list and drawings to the City for approval.

Compensation for designing, furnishing, installing, maintaining and removing temporary traffic signal equipment is included in the contract lump sum price for the signal item involved and additional compensation shall not be allowed.

D. INTERNET BASED CONSTRUCTION MANAGEMENT SYSTEM

The Engineer and Contractor shall utilize Virtual Project Manager (http://www.virtual-pm.com/), herein after called VPM, for submission of all data and documents (unless specified otherwise in this Section) throughout the duration of the Contract. VPM is an electronic project management system accessible through the Internet used to create, share, and review construction management documentation. VPM is provided by the Engineer at no cost to the Contractor. VPM will be made available to all Contractors' personnel, subcontractor personnel, suppliers, consultants, Engineer, and any of Engineer's representatives or agents. The joint use of this system is to facilitate electronic exchange of information, automation of key processes, electronic notification of project activity, and overall management of contract documentation. VPM shall be the primary means of project information submission and management.

The Engineer will establish the Contractor's access to VPM by enabling access and assigning user profiles to Contractor personnel, including subcontractors and suppliers, as requested by Contractor. All authorized personnel shall have an individual user profile; no joint-use or shared user profiles will be allowed. Each user profile shall be assigned to a user group and have specific permission settings and privileges based on the user's need within VPM. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on VPM shall be the responsibility of the Contractor.

The Contractor shall use computer hardware and software that meets the requirements of the VPM system. As recommendations are modified by VPM, the Contractor will upgrade their system(s) to meet or exceed the recommendations. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The Contractor shall ensure its own connectivity to VPM through their internet service provider.

The Contractor shall be responsible for the validity of the information they place in VPM, for the training of their personnel to understand and utilize VPM, as well as the provision and accessibility of adequate resources to connect with VPM. Accepted users shall be knowledgeable in the use of computers, including Internet browsers, email programs, and the Portable Document Format (PDF) document type. The Contractor shall utilize the existing forms in VPM to the maximum extent possible. If a form does not exist in VPM the Contractor must include their own form or a form provided by the Engineer as an attachment to a submittal, RFI, or other document within VPM. Note that only the following file types are accepted as attachments to documents within VPM: PDF files, Microsoft Word (DOC) files, Microsoft Excel (XLS) files, picture files (JPG, TIFF, BMP, JPEG, etc.). PDF documents will be created through electronic conversion prior to uploading, such as through a "print to file" feature or "save as pdf" feature, rather than optically scanned whenever possible.

Contractor shall provide a list of key VPM personnel for the Engineer's acceptance. The list shall include the following information: first name, last name, address, title, office phone number, cell phone number, and email address. The Engineer is responsible for adding and removing users from the system and establishing read, write, and approval permission levels.

1-4.05 CONSTRUCTION SCHEDULE

Prior to the pre-construction meeting, the Contractor shall submit a proposed construction schedule to the City. The construction schedule shall be in the form of a tabulation, chart, or graph and shall be sufficiently detailed to show the chronological relationships between all activities of the project. These activities include, but are not limited to, estimated starting and completion dates, submittal of shop drawings, procurement of materials, and scheduling of equipment. The construction schedule shall be consistent with the time and order of work requirements of the contract.

City approval is contingent upon the content of the Contractor's construction schedule. The schedule must show the work to be completed during each month and must demonstrate that the work can be completed within the time set forth in the contract documents.

1-4.06 AUTHORITY OF INSPECTORS

City authorized inspectors have the responsibility to evaluate materials and workmanship of those portions of the work to which they are assigned and, to report to the City Engineer, observed deviations from the drawings, specifications, and other contract provisions which may come to their notice. City authorized inspectors have the right to order the work subject to their inspection stopped if non-compliance to City standards is indicated; in these cases the City Engineer shall be notified by the inspector within 4 working hours. The City Engineer shall determine how and when the work may proceed in accordance with the contract requirements.

1-4.07 SUPERVISION

The Contractor shall continuously supervise their work and shall designate in writing to the City the name of representatives who shall be present at the work site. The authorized representative shall have full authority to direct the work and shall receive and comply with directions from the City. The Contractor shall provide the City written notice of changes to authorized representatives as soon as practicable but not more than 2 working days after any change.

1-4.08 SURVEYING

The City may provide reference control points for the Contractor's operations.

The Contractor shall be responsible for preserving all construction stakes and points set for lines, grades or measurements of the work in their proper place until authorized by the City to remove them. Expense incurred in replacing stakes that have removed, damaged or destroyed shall be at the contractor's expense.

A. Permanent Survey Markers

When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, the Contractor shall adjust the monument cover to the new grade in accordance with applicable laws and ordinances.

1-4.09 INSPECTION

The City shall have access to the work during construction and shall determine that materials and workmanship are in accordance with these specifications. All work done and all materials furnished shall be subject to inspection. Work buried and/or covered without the favorable review and approval of the City shall be exposed or uncovered for inspection at the Contractor's expense and at the discretion of the City.

Whenever the Contractor varies the period during which work is carried on each day he shall give notice to the City so that inspection may be provided. Any work done without proper inspection may be rejected.

The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill the contract.

If work is to be completed after normal business hours then the Contractor shall call the City 48 hours (2 working days) in advance to schedule an inspection to be made after normal business hours.

1-4.10 TESTING

All tests required by the City shall be by a testing agency approved by the City. The City shall pay for the tests which passed. Failed tests shall be paid for by the Contractor. The City shall require re-testing until all required tests pass.

The testing program, including the quantity and timing of tests, shall be developed and completed under the direction of the City and shall be approved by the City.

1-4.11 REMOVAL OF DEFECTIVE OR UNAUTHORIZED WORK

All work which is defective in its construction, or deficient in any of the requirements of these specifications, shall be, at the City's discretion, either removed or replaced by the Contractor. Compensation will not be allowed for the correction.

Work done beyond the lines and grades shown on the plans, or beyond the limits established by the City, or any extra work done without written authority, is unauthorized and will not result in payment, compensation or time extensions to the Contractor.

Upon failure of the Contractor to comply with any requirement of the City made under the provisions of this article, the City Engineer shall have the authority to cause defective work to be removed and replaced, unauthorized work to be removed and to deduct the costs thereof from any payment due to the Contractor.

1-4.12 ADDITIONAL AND EMERGENCY PROTECTION

Whenever, in the opinion of the City Engineer, the Contractor has not taken sufficient precautions for the safety of the public, the protection of the proposed work, or of property which may be distressed by construction on account of such neglect; and whenever, in the opinion of the City Engineer, immediate action is necessary to protect public or private, personal or property interests, the City, with or without notice to the Contractor, may provide protection by causing work to be done and material to be furnished as shall provide the protection that the City Engineer considers necessary and adequate. The cost and expense of the work and material shall be borne by the Contractor.

Emergency work under the direction of the City shall in no way relieve the Contractor from damages which may occur during or after such precaution has been taken by the City.

1-4.13 SUBSURFACE DATA

All soil and test soil data, water table elevations, and soil analyses included or referred to in the contract documents apply only at the location of the test holes and to the depths indicated. Soil test reports for test holes which have been drilled are available for inspection at the City Engineer's

office. Additional subsurface exploration that may be required for the successful completion of the project shall be done by the Contractor at his own expense.

The indicated elevation of the water table is that existing at the time the test hole data was developed in the field. The Contractor has the responsibility to determine and allow for ground water during project construction. A difference in elevation between ground water shown in soil boring logs and ground water actually encountered during construction will not be considered as a basis for extra work or extra costs.

1-4.14 DIFFERING SITE CONDITIONS

During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract, or if physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site then the party discovering the conditions shall promptly notify the City Engineer in writing of the differing conditions before they are disturbed and before the work is performed.

Upon written notification, the City will investigate the conditions, and if the City determines that the conditions materially differ from those assumed in the contract and cause an increase or decrease in the cost or time required for the performance of any work under the contract then an adjustment, excluding loss of anticipated profits, will be made and the contract modified in writing accordingly. The City will notify the Contractor when an adjustment of the contract is warranted.

Contract adjustments which result in benefits to the Contractor will not be allowed unless the Contractor has provided the required written notice.

Contract adjustments will not be allowed under the provisions specified in this section for any effects caused on unchanged work.

1-4.15 BENEFICIAL USE

The City shall have the right to make beneficial use of completed portions of the work. The Contractor shall provide proper access to the work for this purpose, but such use and operation shall not constitute an acceptance of the work until the entire work under this contract is accepted by the City Council. The City shall perform normal maintenance on approved portions of work placed in service. Nothing in this section shall be construed as relieving the Contractor from full responsibility for correcting defective work or materials. Nothing in this section shall relieve the Contractor of his responsibility to complete the work specified under the contract within the allotted contract time.

Such action by the City will not relieve the Contractor of responsibility for injury or damage to completed portions of the improvement resulting from the action of the elements or from any other

cause, distress or damage resulting from the Contractor's operations or negligence. The Contractor may be required to clean portions of the improvement before final acceptance.

1-4.16 FINAL INSPECTION

Before final inspection of the work, the Contractor shall clean the project site and all ground occupied by him in connection with the work of all rubbish, excess materials, false work, temporary structures and equipment shall be removed. The site shall be left in a neat and presentable condition, as determined by the City Engineer. Full compensation for final clean is included in the prices paid for the various contract items of work and separate payment will not be made.

The Contractor or Developer shall submit record drawings to the City for approval, as a requirement of the final inspection.

Upon completion of the final inspection, the City Engineer will recommend that the City Council accept the work. The work is not complete until accepted by the City Council.

CONTROL OF MATERIALS

1-5.01 SAMPLES AND TESTS

At the option of the City all materials furnished by the Contractor shall be approved by the City before delivery. Preliminary samples shall be submitted by the Contractor for testing or examination as required by the City. Purchase or delivery of the materials is at the Contractor's risk until the City has approved the samples.

All approved tests samples of materials furnished by the Contractor shall be made in accordance with industry standards and as approved by the City Engineer.

The Contractor shall furnish without charge samples of materials as required by the City. Samples will be tested at the City's discretion to determine the quality of the materials.

The Contractor shall be responsible for, and shall pay for, all required tests of materials required, unless otherwise specified in the contract documents.

The City has the right to witness all tests and the Contractor shall furnish adequate notice of when tests will be made.

Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor. Functional testing of mechanical and electrical equipment shall be the sole responsibility of the Contractor.

If, in the opinion of the City Engineer, additional tests or inspections are required because of the manner in which the Contractor executes the work then the tests and inspections shall be initially paid for by the City and will then be deducted from payment due to the Contractor.

1-5.02 SUBMITTALS

The Contractor shall submit shop drawings, product literature, etc., as required in the specifications, for review by the City. Within ten working days of signing the contract and prior to the commencement of work, the Contractor shall submit seven copies of all equipment and material specifications that are to be used for the project, including all substitutions for approval by the City. The City Engineer may modify the material submittal schedule upon written request by the contractor. Shop drawings shall be submitted at least 21 calendar days before the drawings will be used for any work. Shop drawings shall be of a size and scale to clearly show all necessary details.

Submittals will be marked as follows:

a. **No Exceptions Taken**

Accepted subject to its compatibility with future submissions and additional partial submissions for portions of the work not covered in this submission. Does not constitute approval or deletion of specified or required items not shown in the partial submission.

b. **Make Corrections Noted**

Same as "No Exceptions Taken" except that minor (re-submittal not required) corrections as noted shall be made by the contractor.

c. **Amend and Resubmit**

Inconsistencies or errors shall be resolved or corrected by the contractor prior to subsequent review by the City.

d. **Rejected – Resubmit**

Submitted material does not conform to the project documents.

Review by the City does not constitute acceptance by the City of any responsibility for the accuracy, coordination and completeness of the shop drawings or the items of equipment represented on the drawings. Accuracy, coordination, and completeness of shop drawings shall be the sole responsibility of the contractor, including responsibility to back-check comments, corrections, and modifications from the City's review.

Preparation of re-submittal materials of inadequate submittals will not be reason for additional compensation or contract time.

1-5.03 PROTECTION OF WORK AND MATERIALS

The Contractor shall provide and maintain bonded storage facilities and employ measures required to preserve the quality and fitness of materials used in the work. Stored materials shall be accessible for inspection. The Contractor shall protect new and existing work and all equipment for the duration of the contract. The Contractor shall not, without the City's consent, assign, sell, mortgage, hypothecate (pledge as security or collateral for a debt without transfer of title or ownership), or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the contract.

1-5.04 DEFECTIVE MATERIALS

All materials not conforming to the requirements of these specifications shall be considered defective, and all materials, whether in place or not, shall be rejected and shall be removed

immediately from the site of the work unless otherwise directed by the City. Rejected materials shall not be used unless the defects have been mitigated. The contractor shall guarantee the repairs for the life of the project and shall secure the guarantee with a bond.

Upon failure on the part of the Contractor to comply with any order of the City made under the provisions of this article, the City shall remove and replace the defective material and deduct the cost of the removal and replacement from payment due to the Contractor.

1-5.05 CERTIFICATES OF COMPLIANCE

A Certificate of Compliance shall be furnished prior to the use of any materials for which these specifications or the contract documents require that certificates shall be furnished. The City may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The Certificate shall be signed by the manufacturer of the material or the manufacturer of the assembled materials and shall state that the materials comply with the requirements of the specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot certified shall be identified in the certificate.

All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the plans and specifications. Material not conforming to these requirements may be rejected, whether in place or not.

1-5.06 DISPOSAL OF EXCESS MATERIAL

Excess material shall be disposed of in a legal manner. Disposal on private property may be done only with the prior written consent of the property owner and only if in accordance with applicable laws, codes and ordinances.

1-5.07 SUBSTITUTIONS

Before materials are accepted as substitutes, the contractor shall submit complete product information that verifies that the equipment or material being offered is equal to that specified. No substitutions will be allowed until requested and approved in writing. Only equipment and/or materials approved by the City may be substituted. The City reserves the right to require the originally specified equipment and/or materials.

The contract completion time shall not be adjusted due to circumstance developing from the provisions of this subsection.

Installation of an approved substitution shall be the Contractor's responsibility, and revisions required for the installation of substituted materials and/or equipment shall be made without additional expense to the City.

1-5.08 RECORD DRAWINGS

The Contractor shall maintain one set of full size prints and mark thereon any deviations from plan dimensions, elevations, or orientations, and shall submit same in good condition to the City upon completion of the work. Marked prints shall be updated at least once each week and shall be available to the City for review. The plans shall be kept at the job site until project completion. All markings shall be legible, single line cross-outs shall be used exclusively and the plans shall be kept clean and in a reproducible condition.

1-5.09 MANUALS

The Contractor shall furnish the City with two copies of a manual for all Contractor installed components requiring maintenance manuals. These shall include electronic products such as traffic signals, vehicle detector systems, amplifiers, and various controllers as well as mechanical items. The manual shall be submitted at the time the controllers are delivered for testing or, if ordered by the City, prior to purchase.

The manual shall include, but may not necessarily be limited to, the following items:

A. Date of manual
B. Specifications
C. Design characteristics
D. General operations theory
E. Function of all controls
F. Trouble Shooting Procedure (diagnostic routine)
G. Block circuit diagram
H. Geographical layout of components
I. Schematic diagrams
J. List of replaceable component parts with stock number
K. Local suppliers of all components

UTILITIES

1-6.01 LOCATION

The City will search City records and indicate on the plans those utilities, except service connections, which may affect the work. Location of service connections shall be the responsibility of the contractor and shall be included in the bid price. Available information regarding removal, relocation, or disconnection of utilities, or installation of new utilities, will be furnished to prospective bidders before the receipt of bids. The Contractor shall immediately report to the City those utilities omitted from the plans or found substantially at variance with the location shown.

At least two working days prior to commencing work, the Contractor shall request utility owners to mark or otherwise indicate the location of their facilities. The locations of utilities as shown on the plans are approximate. The Contractor shall have the responsibility to determine the location and depth of all utilities and service connections affecting the work, prior to the performance of the work. The contractor shall also verify the type, material, and condition of any utility which may be affected by the work.

1-6.02 PROTECTION

The Contractor shall not interrupt the service or disturb the supporting base of any utility, without authority from the utility owner.

Where protection for utilities is required the Contractor shall furnish and place the necessary protection at his expense.

The Contractor shall immediately notify the City and the utility owner if utilities are disturbed, disconnected or damaged. If the utility is located as indicated on the plans or as marked in the field then the Contractor shall bear the full costs of repair or replacement.

When placing concrete around or contiguous to any utility, the Contractor shall, at his expense, furnish and install an expansion joint, clear opening, sleeve, or other suitable means, approved by the utilities in writing, to prevent the utilities from bonding with the concrete.

1-6.03 NOTIFICATION

The Contractor shall give written 48-hour advance written notice to all customers who may be affected during an outage of any utility.

1-6.04 REMOVAL

The Contractor shall remove all portions of utilities instructed on the plans as to be removed. Before removal the Contractor shall verify from the utility owner that their abandonment is complete. The

costs involved in the removal and disposal shall be included in the Contractor's bid and additional compensation shall not be allowed.

1-6.05 RELOCATION

The owners of utilities within the area affected by the work should complete their installations, relocations, repairs, or replacements before commencement of work by the Contractor. When a utility is to be relocated, altered or constructed by others, the City will negotiate with the utility owners and the responsibility for the work will be specified in the contract documents.

Utilities that interfere with the permanent project work after award of the contract, will be relocated, altered, or reconstructed by the utility owners, or the City may order changes in the work to avoid interference.

When the plans or specifications provide for the Contractor to alter, relocate, or reconstruct a utility, all costs for such work shall be absorbed in the Contractor's bid. Temporary or permanent relocation or alteration of utilities desired by the Contractor for his convenience shall be the contractor's responsibility and he shall make all arrangements and bear all cost. The City shall not be involved in any agreement between the contractor and the utility owners.

1-6.06 DELAYS

The Contractor is responsible for notifying utility owners to prevent delays attributable to utility relocations or alterations as called for in the contract documents. The Contractor shall not be entitled to damages or additional payment if delays occur. The City will determine the effect of the delay on the project as a whole and may alter the project timelines.

1-6.07 COOPERATION

The Contractor shall conduct his operations to permit access to the worksite and to provide time for utility work.

1-6.08 EXISTING UTILITIES

Rearrangements in utilities, for the Contractor's convenience, are the responsibility of the contractor unless otherwise indicated in the contract documents.

Utility companies may, under the authority of a City encroachment permit, enter upon any City public highway, road or right of way, for the purpose of making repairs and changes that have become necessary by reason of the proposed improvements.

The Contractor is responsible for maintaining ditches, canals, pipes, conduits, wires, diversion boxes, and other appurtenances. The Contractor shall make arrangements with the distributors of irrigation water to coordinate his construction so as to not cause service interruption.
Irrigation works damaged or removed by the Contractor shall be repaired or replaced by the contractor at his expense and to the satisfaction of the City and the irrigation water distributor.

1-6.09 UTILITY COMPANIES

Utilities may be affected during construction and the Contractor has the responsibility to contact the affected utility owners prior to commencement of the work and at times necessary during construction. Affected utilities may include water, sewer, storm drain, gas, electric, telephone, cable, fiber optics, and railroad.

LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

1-7.01 LAWS TO BE OBSERVED

The Contractor shall comply with:

a. all county, state and federal laws and regulations

b. all municipal ordinances and regulations of the City

c. all orders and decrees of bodies or tribunals having jurisdiction or authority

d. all building codes that have been adopted by the City

e. Section 504 of the Rehabilitation Act of 1983 as incorporated in the Revenue Sharing Act. Each bidder shall submit certification with his bid that he is in compliance with this Act as specified in §51.55 of the General Sharing Regulations

f. prior to erecting signal standards - special dispensation authorization from the California Occupational Safety and Health administration to conduct operations no closer than 6 feet but within 10 feet of a high voltage line prior to erecting signal standards.

1-7.02 EMPLOYMENT

A. Nondiscrimination

In connection with the performance of work under this contract, the Contractor agrees that neither he nor any subcontractor who performs any work or labor or renders any service pursuant hereto shall discriminate against any employee or applicant for employment because of race, color, religion, pregnancy, gender, sexual orientation, marital status, national origin, ancestry, disability, medical condition or age.

B. Affirmative Action Program Certification

Each bidder shall submit certification with his bid that he complies with the Civil Rights Act of 1964, Executive Order No. 11246, the California Fair Employment Practices Act, and any other applicable federal and state laws and regulations relating to equal opportunity employment.

The Contractor shall submit a statement each month while the project is in progress certifying that he is in compliance with the above laws and regulations. The certification shall be on a form approved by the City. The project is in progress upon issuance of the Notice to Proceed and until project acceptance by the City Council.

If, on or before the 20th of any month, the Contractor has not submitted the required certificate for the current month then the City will retain from the monthly estimate an amount equal to 2% of the estimated value of the work performed during the month, except that such retention shall not exceed $2,000 nor be less than $500. Retentions for failure to submit a certificate shall be in addition to all other retentions provided for in this contract. After the required certificate is received, the retention for that certificate will be released with the next monthly progress payment.

C. Apprentices

The Contractor and all subcontractors shall comply with the provisions of §1777.5 et seq of the California Labor Code. The responsibility for compliance with these provisions is fixed with the Prime Contractor for all apprentice occupations.

If the Prime Contract involves less than $30,000 or less than 20 days then Labor Code §1777.5 shall not apply.

1-7.03 HOURS OF LABOR

The Contractor shall forfeit, as penalty to the City, $25 for each worker employed in the execution of the contract by him or her or by any subcontractor, for each calendar day during which any worker is required or permitted to labor more than 8 hours in violation of the provisions of the Labor Code, and in particular, §1810 to §1815. However, work performed by any worker in excess of 8 hours per day shall be permitted upon compensation for all hours worked in excess of eight hours a day at not less than 1½ times the basic rate of pay as provided for in the Labor Code.

1-7.04 PREVAILING WAGES (WHEN REQUIRED BY SPECIAL PROVISIONS)

Bidders are hereby notified that pursuant to §1770 et seq. of the Labor Code of the State of California, the Director of the Department of Industrial Relations of the State of California has ascertained the general prevailing rate of hourly wages and rates for overtime, Saturday, Sunday and holiday work in the locality where this work is to be performed for each craft or type of worker or mechanic needed to execute the contract which will be awarded the successful bidder. Refer to "General Wage Determination made by the Director of Industrial Relations pursuant to California Labor Code Part 7, Chapter 1, Article 2, §1770, 1773, and 1773.1". The Contractor shall post a copy of the prevailing wage rates at each job site.

The Contractor shall comply with the provisions of Labor Code §1775. In accordance with §1775, the Contractor shall forfeit, as a penalty to the City, $25 for each calendar day, or portion thereof, for each worker paid less than the stipulated prevailing rates for such work or craft in which the worker is employed for any public work done under the contract by him or by any subcontractor under him. In addition to the penalty, the Contractor shall pay to each worker the difference between the

stipulated prevailing wage rate and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate.

The Contractor and all subcontractors shall comply with the provisions of §1776 of the California Labor Code, regarding payroll records. Compliance with §1776 shall be the Contractor's responsibility.

The Contractor may pay compensation to workers in excess of the prevailing wage rate as determined above; however, such payments shall not be the basis for any claim for additional compensation to the Contractor by the City. Wage increases will not be considered as a basis for claims for additional compensation.

The City will require submittal of Certified Payrolls from the Contractor when they are needed to verify that the Contractor is in compliance with the State Labor Code or when needed to confirm the cost of work or the cost of proposed changes. The payrolls shall be on a form and at a frequency as required by the City.

If certified payrolls are requested and if, on or before the 20th of the month, the Contractor has not submitted satisfactory certified payrolls for all work performed during the monthly period ending on or before the 6th of that month then the City will deduct an amount equal to 10% of the estimated value of the work performed during the month from the next monthly estimate, except that such deduction shall not exceed $10,000 nor be less than $1,000 for each month.

Deductions for failure to submit satisfactory certified payrolls shall be in addition to all other deductions or retentions provided for in this contract or by state and federal law. The deduction for failure to submit certified payrolls for each monthly period will be released for payment on the monthly estimate for progress payments next following the date that all the satisfactory certified payrolls for which the deduction was made are submitted.

The total of all deductions being held for certified payroll record submittal can be more than the aforementioned limits, since each month's deduction stands on its own, and consequently, can accumulate beyond $10,000.

1-7.05 PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees and give all notices necessary and incidental to the due and lawful prosecution of the work.

1-7.06 PATENT FEES AND ROYALTIES

The Contractor shall absorb in his bid, the patent fees or royalties on any patented article or process which may be furnished or used in the work. The Contractor shall indemnify and hold the City harmless from any legal action that may be brought for infringement of patents.

1-7.07 COOPERATION AND COLLATERAL WORK

The Contractor shall be responsible for ascertaining the nature and extent of any simultaneous, collateral and essential work by others. The City, and others, shall have the right to operate within or adjacent to the worksite to perform such work.

The City reserves the right to award other contracts in connection with the project, the work under which may proceed simultaneously with the work to be done under other contracts. The Contractor shall coordinate his operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials, and in the detailed execution of the work. The Contractor and his subcontractors shall remain aware of the progress of others and shall notify the City immediately of lack of progress or defective workmanship on the part of others, where such delay or such defective workmanship will interfere with the contractor.

Failure of the Contractor to keep informed of the work progressing on the site and failure to give the City notice of lack of progress or defective workmanship by others shall be construed as acceptance by the contractor of the status of the work as being satisfactory for proper coordination with his own work. The Contractor and others shall adjust, correct and coordinate their work with the work of others so that discrepancies are not created in the work.

If the Contractor or any of his subcontractors or employees, cause loss or damage to any others on the work then the Contractor, by agreement or arbitration, will settle any claim for such loss or damage. If other contractors sue the owner on account of loss then the owner shall notify the Contractor, who shall indemnify and save harmless the owner against any loss or damage arising therefrom, including the cost and expense of defending any suit.

The City, the contractor and others shall coordinate their operations and cooperate to minimize interference. The Contractor shall absorb in his bid all costs involved on his part as a result of coordinating his work with others.

The Contractor will not be entitled to additional compensation from the City for damages resulting from simultaneous, collateral and essential work. If necessary to avoid or minimize such damage or delay then the Contractor shall deploy his labor force to other parts of the work.

Where the work of one trade joins or incorporates other work, there shall be no discrepancy when the work is completed. In engaging one kind of work with another, marring or damaging of the previously completed work will not be permitted. Should improper work of any trade be covered by another which results in damage or defects, the whole work affected shall be made good by the Contractor without expense to the City.

1-7.08 USE OF PREMISES

The Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the project site and areas identified in and permitted by the contract documents and other land and areas permitted by laws and regulations, right-of-ways and permits

and easements. The contractor shall not encumber the site with materials or equipment. The Contractor shall assume full responsibility for any damage to any land or area, or injury to the owner or occupant, or damage to any land contiguous thereof, resulting from the performance of the work. If any claim is made against the City by any owner or occupant because of the performance of the work then the Contractor shall promptly attempt to settle the other party by agreement or otherwise resolve the claim by arbitration or law. The Contractor shall indemnify and hold the City harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professional, court and arbitration costs) arising directly or consequentially out of any action, legal or equitable, brought by any other party against the City to the extent based on claims arising out of the Contractor's performance of the work.

1-7.09 PROJECT SITE MAINTENANCE

A. Cleanup and Dust Control

Throughout all phases of construction, including suspension of work, and until final acceptance of the project by the City Council, the Contractor shall keep the work site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning, sweeping, sprinkling with water, or other means as necessary and in accordance with design requirements. The use of water resulting in mud on public streets will not be permitted as a substitute for sweeping or other methods.

The Contractor shall be required to apply water for dust control at all times, including Saturdays, Sundays, designated legal holidays, and other such times in which construction activities are not in progress. If dust control, in the opinion of the City Engineer, is not adequate then the City will have this work done by others and will deduct the cost from payment due to the Contractor.

The Contractor shall take all precautions required so that material and debris is not deposited on public streets. If construction operations cause material to be deposited on public streets then the Contractor shall furnish and operate a self-loading motor sweeper with spray nozzles at least once each working day to keep paved areas clean until acceptance of the project by the City Council.

Materials and equipment shall be removed from the site as soon as they are no longer necessary. Upon completion of the work and before final inspection the entire worksite shall be cleared of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the Contractor's bid.

All traffic, street and traffic control signs removed during the work shall be temporarily reset by the Contractor at the original location upon completion of each phase of the work. Prior to removal of traffic, street and traffic control signs, the Contractor shall take photographs of the site which show the existing location of these signs so that upon completion the photographs may aid in resetting the signs at their original location. Traffic, street and traffic

control signs will be replaced upon completion of the work and the cost of removal and replacement will be included in various bid items; separate payment will not be made.

Rural type mail boxes shall be maintained by the Contractor in a manner satisfactory to the property owner and postal service, and the Contractor shall relocate same as soon as practicable to a permanent location in accordance with postal regulations and in a location acceptable to the property owner.

Care shall be taken to prevent spillage on haul routes. Spillage shall be removed immediately and the area cleaned. From the time of the spill until clean-up is complete the contractor shall provide all necessary traffic controls. The contractor shall immediately report hazardous material spillage to the City Engineer and to Emergency Services (fire and police).

Excess excavated material shall be removed from the site immediately. Sufficient material may remain for use as backfill if permitted by the project specifications. Forms and form lumber shall be removed from the site as soon as practicable after use.

The Contractor shall not permit any part of any structure to be loaded in any manner that will endanger the structure. The Contractor shall not expose any part of the work or adjacent property to stresses or pressures that may result in distress or damage.

Earth dams will not be permitted at catch basin openings, local depressions, or elsewhere, except during emergencies. Temporary dams of sand bags, asphaltic concrete or other acceptable material may be permitted when necessary to protect the work provided their use does not create a hazard or nuisance to the public. Dams shall be removed from the site as soon as their use is no longer necessary.

Failure of the Contractor to comply with the City's cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation will be allowed as a result of the suspension.

B. Pest Control

At the time of acceptance, structures entirely constructed under the contract shall be free of rodents, insects, vermin and all other pests. Extermination work shall be arranged and paid for by the Contractor as part of the contract work within the contract time and shall be performed by a licensed agency in accordance with requirements of governing authorities. The Contractor shall be liable for injury to persons or property and shall be responsible for the mitigation of offensive odors resulting from extermination operations.

The contractor shall post a durable notice (English and Spanish) in a conspicuous place that states the type of extermination employed, the date the extermination methods were applied and that lists the pesticides, herbicides, insecticides or poisons used. The American Association of Poison Control Centers (AAPCC) hotline shall also be presented on the notice (1-800-222-1222).

C. Sanitation

The Contractor shall provide and maintain enclosed toilets for the use of employees. These accommodations shall be maintained in a neat and sanitary condition. They shall also comply with all applicable laws, ordinances and regulations pertaining to the public health and sanitation of dwelling and camps. All temporary facilities shall be provided with hand washing equipment that includes liquid soap in a dispenser, potable water, disposable hand towels and a closed lid trash container actuated by motion sensors or foot control.

Sewage flows shall not be interrupted. Should the Contractor disrupt existing sewer facilities then sewage shall be conveyed in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches or to be covered by backfill.

1-7.10 TEMPORARY LIGHT, POWER, AND WATER

The Contractor shall, at his own expense, furnish, install, maintain, and remove all temporary light, power, and water, including piping, wiring, lamps, and other equipment, necessary for the work. The Contractor shall not draw water from any fire hydrant, except to extinguish a fire, without first obtaining the necessary permits and metering devices. The contractor shall make payment for use of temporary utilities before the project will be accepted as complete by the City Council.

1-7.11 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

The Contractor shall be responsible for the protection of public and private property adjacent to the work and shall exercise due caution to avoid damage to such property.

Unless otherwise provided, the Contractor shall repair or replace all existing improvements (e.g., curbs, sidewalks, driveways, fences, signs, utilities, street surfaces, structures, survey markers, etc.) damaged or removed as a result of his operations. Repairs and replacements shall be at least equal in kind and quality to existing improvements, and shall match them in finish and dimension.

Trees, lawns, and shrubbery not designated for removal shall be protected from damage or injury. If damaged or removed because of the Contractor's operations then they shall be restored or replaced in their original condition and location. Lawns shall be reseeded and covered with mulch by the contractor.

All costs to the Contractor for protecting, removing, and restoring existing improvements shall be included in the bid.

1-7.12 PUBLIC CONVENIENCE AND SAFETY

A. The Contractor shall conduct his operations so as to result in the least possible inconvenience to the general public and to the residents in the vicinity of the work. Public convenience and safety shall conform to §7-1.08 "Public Convenience" and §7-1.09, "Public Safety" of the State Standards, and the California Manual on Uniform Traffic Control Devices. If lane or street closures are required for the work then the Contractor shall submit a traffic control plan to the City for approval 72 hours (3 working days) before closure.

Traffic controls through the construction zone shall be designed and maintained by a designated individual qualified in this responsibility. Evidence of qualification may be a Certificate of Completion of a course entitled "Safety Through Maintenance and Construction Zones," issued by the Institute of Transportation Engineers (ITE).

The Contractor shall furnish, erect, and maintain fences, barriers, lights and signs necessary to give adequate warning to the public at all times that the work is in progress and of any dangerous conditions that may be encountered as a result. The contractor shall also erect and maintain warning signs required by the City. Temporary traffic controls and markings shall be removed by the contractor when no longer needed.

B. Before excavating any trench 4 feet or more in depth (or at lesser depths as warranted by site soils conditions and as determined by a qualified, California registered soils engineer) the Contractor shall submit a detailed plan to the City showing the design of shoring, bracing, sloping, or other provisions to be made for the workers' protection from the hazard of caving ground during the excavation of the trench. The plan shall be prepared by a registered civil engineer. No excavation shall start until the City has accepted the plan and the Contractor has obtained a permit from the State Division of Industrial Safety. A copy of the permit shall be submitted to the City prior to the work.

C. Notice to Agencies - The Contractor shall provide written notification to all agencies having jurisdiction at least 48 hours (2 working days) prior to instituting any lane closure or detour. At the end of each day's work, the Contractor shall inform ambulance services and police and fire departments of the status of all detours and/or lanes or road closures. The Contractor shall cooperate with the U.S. Postal Service, collection services for trash and garbage, and bus services to maintain existing schedules for these services.

D. Emergency Vehicle Access Through Detours - During all detours and/or street closures, the Contractor shall provide for the unencumbered movement of emergency vehicles through the work area. The Contractor's work and equipment shall not impede movement from any fire or police station to any area of their jurisdiction.

E. Access to Private Property - The Contractor shall schedule operations to minimize disruption of access to private property. Prior to blocking access to any private driveway or parking lot entrance, the Contractor shall notify the resident or business owner or tenant of pending

closure and allow residents to remove vehicles. During non-working hours driveways, houses or parking lots shall not be denied access to a public roadway.

F. Night Detours - The Contractor shall not be permitted to maintain any lane closure or road closure during non-working hours without first obtaining written approval of the City. During non-working hours the Contractor shall restore travel lanes to their original alignment and configuration by means of backfilling and temporary pavement or bridging. The Contractor shall place “Rough Road” signs conforming to the Manual of Traffic Control at uneven temporary pavement or bridging.

G. Parking Restrictions - The Contractor shall post approved “No Parking” signs at all locations necessary to establish work areas and detour traffic. Signs shall read: "No Parking - Construction Tow Away Zone", show hours of parking restriction and indicate telephone number of the police agency having jurisdiction. Signs shall be placed at least 48 hours in advance of restriction.

H. Bridging Over Trenches and Excavations - Bridging shall be placed across all trenches and excavations of existing streets and at driveways when work is not in progress. Bridging for vehicular traffic shall be of sufficient width to accommodate the required number of travel lanes. Bridging shall be designed to support AASHTO H-20 vehicular traffic. All bridging shall be set flush with travel surface or a satisfactory transition from travel surface to top of bridging shall be provided.

A satisfactory transition shall mean a change in elevation between the levels of not less than 12 inches horizontal to 1 inch vertical.

Transition may be accomplished by means of temporary pavement.

I. Temporary Traffic Lanes - Temporary traffic lanes shall be at least 10 feet wide, with an additional 2 feet of clearance from curbs. The length of temporary lanes should be limited to the area under construction and the distance necessary to divert traffic.

J. The Contractor shall provide his own staging areas.

1-7.13 INDEMNIFICATION

The Contractor shall hold harmless, defend and indemnify the City, its agents, officers, officials, employees and volunteers from and against all claims, damages, losses and expenses, including attorney fees, arising out of the performance of the work described herein, caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except where caused by the active negligence, sole negligence, or willful misconduct of the City.

1-7.14 INSURANCE REQUIREMENTS

The contractor's attention is directed to the insurance requirements below. The bidders should confer with their insurance carriers and/or brokers to determine in advance of bid submission the availability of insurance certificates and endorsements as prescribed and provided herein. If an apparent low bidder fails to comply with the insurance requirements then that bidder may be disqualified from award of the contract. Insurance requirements are a material element of the contract and failure to effect, maintain, renew, or provide proper proof of coverage may be treated as a material breach of the contract. The City reserves the right to alter, amend, or otherwise modify these requirements as the City may deem necessary.

The Contractor shall provide and maintain the following insurance with insurance companies licensed in the State of California and shall provide evidence of such insurance to the City as may be required by the Risk Manager of the City. The policies or certificates shall provide that, 30 days prior to cancellation or material change in the policy, notices of same shall be given to the Risk Manager of the City by registered mail, return receipt requested, for all of the following stated insurance policies.

A. Workers' Compensation - in compliance with the statutes of the State of California, plus employer's liability with a minimum limit of liability of $500,000.

B. General Liability insurance with a minimum limit of liability per occurrence of $1,000,000 for bodily injury and $100,000 for property damage or $1,000,000 combined single limit. This insurance shall indicate on the certificate of insurance the following coverage and indicate the policy aggregate limit applying to: premises and operations; broad form contractual; independent contractors and subcontractors; products and completed operations.

C. Automobile Liability insurance with a minimum limit of liability per occurrence of $1,000,000 for bodily injury and $100,000 for property damage or $1,000,000 combined single limit. This insurance shall cover any automobile for bodily injury and property damage.

D. Course of Construction insurance with a minimum limit of the complete project if required by the special provisions.

If, at any time, any policy is to the City, as to form or substance or if a company issuing a policy is unsatisfactory to the City then the Contractor shall obtain a new policy, submit the same to the Risk Manager for approval and provide certificates of insurance. Upon failure of the Contractor to furnish, deliver or maintain proper insurance and certificates, contracts with the City, at the election of the City, may be suspended or terminated. Failure of the Contractor to obtain and/or maintain required insurance shall not relieve the Contractor from any liability under any contract. The insurance requirements shall not be construed to conflict with or otherwise limit the indemnification obligations of the Contractor. The City, its agents, officer employees, and volunteers shall be named as an additional insured on all insurance policies required, except Workers' Compensation.

The contractor shall guarantee that the Workers' Compensation insurer agrees to waive all rights of subrogation against the City, its agents, officers, employees, and volunteers for losses arising from work performed by Contractor for the City. The Contractor's insurance policy(ies) shall include a provision that the coverage is primary as respects the City; shall include no special limitations to coverage provided to additional insured; and, shall be placed with insurer(s) with Best's rating of A:VII or with approval of the Risk Manager.

1-7.15 VERIFICATION OF COVERAGE

The Contractor shall furnish the City with Certificates of Insurance and with original endorsements effecting required coverage. The certificates and endorsements must be binding and signed by an authorized agent of the insurer. The certificates and endorsements are to be on forms approved by the City. All certificates and endorsements are to be received and approved by the City prior to the commencement of work. The City reserves the right to require complete, certified copies of all required insurance policies at any time.

1-7.16 SUBCONTRACTORS

The Contractor shall include all subcontractors as insured under its policies or shall furnish separate certificates and endorsements for each subcontractor evidencing coverage for each subcontractor in the form and the amount that meets these specifications.

1-7.17 CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the formal acceptance of the work by the City Council, the Contractor shall be responsible for and have care, custody, and control of the work and of the materials to be used therein, including materials delivered to the work site, materials for which partial payment has been received, and materials which have been furnished by the City; and the Contractor shall bear full risk of loss, injury or damage to any part of the work and materials by action of the elements, or from any other cause, whether arising from the execution or non-execution of the work. The Contractor shall rebuild, repair, restore and make whole all loss or damage to any portion of the work or materials before final acceptance and shall bear the expense thereof, except for such loss or damage occasioned by acts of the Federal Government or the public enemy, or by an Act of God as defined in §4l50 of the California Government Code.

Suspension of the work for any cause whatever shall not relieve the Contractor of his responsibility for the work and materials as specified. The Contractor shall be responsible for, and must make good, any defects arising through faulty, improper or inferior workmanship or materials arising or discovered in any part of the work during one year after the completion and acceptance by the City Council of the project. The Contractor shall be responsible for any damage his activities cause to public or private improvements. The Contractor shall take all measures necessary to protect natural areas from runoff, sedimentation, debris, or other damage resultant from the project activities.

1-7.18 ADVERTISING

The names of contractors, subcontractors, architects, or engineers, with their addresses and designation of their particular specialties, may be displayed on removable signs. The size and location of such signs shall be subject to the City's sign ordinance. Prior to placement of any sign, an application for each sign shall be made to, and approved by the Community Development Department.

Commercial advertising matter shall not be attached to, or painted, on the surfaces of buildings, fences, canopies, or barricades.

1-7.19 HAZARDOUS MATERIALS

Pursuant to §25914.2 of the California Health and Safety Code, in the event the Contractor encounters site materials that he believes to be asbestos or a hazardous substance, and the asbestos or hazardous substance has not been rendered harmless, the Contractor shall immediately cease work on the area affected and report the condition to the City in writing. If the City determines that asbestos or hazardous substances which were not disclosed in the bid are present on the site then all work regarding the removal of those substances will be performed under a separate contract.

1-7.20 AIR POLLUTION CONTROL

The Contractor shall comply with all air pollution control rules, regulations, ordinances and statutes which apply to work performed pursuant to the contract, including air pollution control rules, regulations, ordinances and statutes, specified in §11017 of the Government Code. The Contractor shall comply with all applicable provisions of Regulation VIII of the San Joaquin Valley Air Pollution Control District. The Contractor is alerted to the fact that this regulation imposes specific restrictions and requirements on the Contractor related to the construction activities at the site. The Contractor assumes full responsibility for conforming to the requirements of this regulation. In the event the regulatory agency levies any fine or charge against the City as a result of the Contractor's failure to comply with this regulation, the Contractor shall reimburse the City upon demand the full amount of the fine or charge. The City shall have the right to deduct funds from payment due to the Contractor should the Contractor fail to reimburse the City as stated above. Copies of Regulation VIII may be obtained by contacting:

San Joaquin Valley Air Pollution Control District
4800 Enterprise Way
Modesto, California 95356
Tel: (209) 557-6400

1-7.21 CONTROL OF STORM WATER

The Contractor shall comply with all applicable federal, state, and municipal regulations for the control of storm water pollution associated with construction. The Contractor is alerted that these regulations impose restrictions and requirements on the Contractor related to construction. The Contractor assumes full responsibility for conforming to the requirements of these regulations. If a regulatory agency levies any fine or charge against the City as a result of the Contractor's failure to comply with this regulation then the Contractor shall reimburse the City upon demand the full amount of the fine or charge. The City has the right to deduct funds from payment due to the Contractor should the Contractor fail to reimburse the City as stated above. The Contractor's attention is directed to the California Storm Water Quality Association (CASQA) Storm Water Best Management Practice Handbook.

PROSECUTION AND PROGRESS

1-8.01 SUBLETTING AND ASSIGNMENT

The Contractor shall give his attention to the fulfillment of the contract and shall keep the work under his control, including the work of all subcontractors.

The Contractor shall perform, with its own organization, contract work amounting to not less than 30% (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the City. In order to meet the 30% requirement, the Contractor may contract for direct payment by its own organization for any element or combination of elements of the original contract price, including, but not limited to, materials, manufactured products, labor, equipment rental, tools and incidentals, but excluding "specialty items" (defined in Item B below) totaling not less than 30% of the original price. Specialty items may be performed by subcontract and the amount of the specialty items may be deducted from the total original contract price before computing the amount of work required to be performed by the Contractor.

A. **Its own organization** shall include only workers employed and paid directly by the Prime Contractor and equipment owned or rented by the Prime Contractor, with or without operators. Employees or equipment of subcontractors, assignees, or agents of the prime contractor are not included in the definition.

B. **Specialty Items** shall be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and, in general, are limited to minor components of the overall contract. Only those items of work designated as "Specialty Items" on the contract proposal form shall be considered as such.

The contract amount upon which the requirement set forth above is computed includes the cost of materials and manufactured products which are to be purchased or produced by the Contractor under the contract provisions. Subcontracts shall include provisions that the contract between the City and the Contractor is part of the subcontract, and that all terms and provisions of the contract are incorporated in the subcontract.

Subcontracts shall contain certification by the subcontractor that the subcontractor is experienced, qualified, and knowledgeable about the subcontracted work. Copies of subcontracts shall be provided to the City upon written request. Before work is started on a subcontract, the Contractor shall file with the City a written statement showing the work to be subcontracted, the names of the subcontractors and the description of each portion of the work to be subcontracted. The Contractor shall furnish:

1. a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract

requirements, and is in charge of all construction operations (regardless of who performs the work), and

2. other organizational resources (supervision, management, and engineering services) which the City deems necessary for the completion of the contract.

No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the City and this consent shall not be construed to relieve the Contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the City verifies that each subcontract is evidenced in writing and that the sub-consultant contracts contain all pertinent provisions and requirements of the prime contract.

Where a portion of the work sublet by the Contractor is not being prosecuted in a manner satisfactory to the City, the subcontractor shall, at the request of the City Engineer, be removed immediately and shall not be re-employed on the work.

1-8.02 PROGRESS OF THE WORK

The Contractor shall begin work as soon as possible after receiving the Notice to Proceed from the City and shall diligently prosecute the work to completion. No work shall commence before contract bonds and insurance certificates have been filed with the City and the contract has been signed.

A preconstruction meeting must be held prior to starting any work, or new phase or work, on the project. The City will contact the Contractor no later than 5 working days from the date the contract is signed by the City Engineer to set up the preconstruction meeting which shall be held no later than 10 working days from the contract signing date. The Notice to Proceed shall be issued after the preconstruction meeting.

The Contractor shall provide the City with a proposed project schedule at the pre-construction meeting.

Subsequent to the time that submittal of a progress schedule is required in accordance with these specifications, no progress payments will not be made for any work until a satisfactory schedule has been submitted to the City Engineer.

At any time during the project when, in the opinion of the City Engineer, the project falls more than 20 working days behind the current schedule, the City Engineer may request a revised schedule. The Contractor shall comply with this request within 5 working days and at no additional cost to the City.

The City Engineer shall review the proposed schedule for completeness and reasonableness. If, in the opinion of the City Engineer, the proposed schedule is incomplete or unreasonable then the schedule shall be revised at no additional cost to the City.

Failure to comply with the above provisions shall entitle the City to withhold an additional 10% of the amount due on progress payments until the Contractor complies with these provisions.

1-8.03 CHARACTER OF WORKERS

If any person employed by the Contractor fails or refuses to carry out the direction of the City, or appears to the City to be incompetent or to act in a disorderly or improper manner then that person shall be discharged immediately on the request of the City, and such person shall not be re-employed on the work.

1-8.04 TEMPORARY SUSPENSION OF WORK

The City Engineer has the authority to suspend the work wholly, or in part, for such period as he may deem necessary due to unsuitable weather, or to other unfavorable conditions for the prosecution of the work, or for such time as he may deem necessary, due to the failure on the part of the Contractor to carry out orders given, or to perform any provisions of the work. The Contractor shall immediately adhere to the direction of the City and shall not resume the work until authorized to do so in writing by the City.

If a suspension of work is ordered because:

a. the contractor failed to carry out orders

b. the contractor fails to perform any provision of the contract

c. or by reason of weather conditions being unsuitable for performing any item or items of work, which work, in the sole opinion of the City Engineer, could have been performed prior to the occurrence of such unsuitable weather had the Contractor diligently prosecuted the work when weather conditions were suitable

then the Contractor, at his expense, shall do all the work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public traffic during the period of the suspension as provided in §7-1.08, "Public Convenience," and §7-1.09, "Public Safety," of the State Standards and as specified in the special provisions for the work. Should the Contractor fail to perform the work specified the City will perform the work and the cost will be deducted from payment due to the Contractor.

If the City orders a suspension of all of the work or a portion of the work which is the current controlling operation or operations, due to unsuitable weather or to other conditions unfavorable to the prosecution of the work then the days on which the suspension is in effect shall not be considered working days as defined in §1-8.5, "Time of Completion and Liquidated Damages" of these specifications. If a portion of work at the time of such suspension is not a current controlling operation, but subsequently does become the current controlling operation then the determination of working days will be made on the basis of the then current controlling operation.

If a suspension of work is ordered by the City due to the failure on the part of the Contractor to follow the directions given or to perform any provision of the contract then the days on which the suspension order is in effect shall be considered working days if such days are working days within the meaning of the definition set forth in §1-8.5, "Time of Completion and Liquidated Damages" of these specifications.

In the event of a suspension of work under any of the conditions set forth in this section the suspension shall not relieve the Contractor of his responsibilities as set forth in §1-7, "Legal Relations and Responsibilities to the Public" of these specifications.

1-8.05 TIME OF COMPLETION AND LIQUIDATED DAMAGES

The contractor agrees that in case all the work called for under the contract is not completed before or upon the expiration of the time limit set forth in the contract documents, damage is sustained to the City. The contractor agrees that the actual damage may be indeterminate. The Contractor and his heirs, assigns, and sureties, agrees to pay to the City the sum of $500 per day for each and every calendar day's delay beyond the time prescribed to complete the work. The Contractor agrees to pay liquidated damages as herein provided, and in the case where the penalty is not paid, agrees that the City may deduct the amount thereof from any payment due to the Contractor under the contract.

The contractor agrees that if the contract work is not finished and completed in all parts and requirements within the time specified then the City has the right to extend the time for completion, or not, as may serve the interests of the City. If the City extends the time for the completion of the contract then the City has the right to charge the Contractor and his heirs, assignees, or sureties, and to deduct from final payment for the work, all or any part, of the cost of engineering, inspection, superintendence, and overhead expenses which are directly chargeable to the contract, and which accrue during the period of the extension; the cost of final surveys and preparation of final estimates shall not be included.

Liquidated damages shall not be assessed, nor shall the cost of engineering and inspection during any delay in the completion of the work caused by Acts of God or of the public enemy, acts of the federal government, City, fire, floods, epidemics, severe weather, or delays of subcontractors due to such causes; provided, that the Contractor shall within 10 days from the beginning of such delay notify the City in writing of the causes of delay. The City will analyze the delay and the City’s findings of the facts shall be final and conclusive.

Extension of time will not be granted for delays caused by a shortage of materials unless the Contractor provides the City with proof that he has made every effort to obtain materials from all known sources within reasonable reach of the work in a diligent and timely manner. Further proof may be required in the form of supplementary progress schedules, as required in §1-8.2 "Progress of the Work" of these specification that the inability to obtain materials when originally planned, did in fact cause a delay in final completion of the entire work which could not be compensated for by revising the sequence of the Contractor's operations. The term "shortage of materials," as used in this section, shall apply only to materials, articles, parts or equipment which are standard items and are to be incorporated in the work. The term "shortage of materials" shall not apply to materials,

parts, articles or equipment which are processed, made, constructed, fabricated or manufactured to meet the specific requirements of the contract. Only the shortage of material will be considered under these provisions as a cause for extension of time. Delays in obtaining materials due to priority in filling orders will not constitute a shortage of materials.

The intention of the above provisions is that the Contractor shall not be relieved of liability for liquidated damages or engineering and inspection charges for any period of delay in completion of the work in excess of that expressly provided for in this Section.

The Contractor shall complete the work within the number of calendar days or working days set forth in the special provisions.

A working day is defined as any day, except Saturdays, Sundays and legal holidays and days on which the Contractor is specifically required by the special provisions to suspend construction operations and except days on which the Contractor is prevented by inclement weather or conditions resulting immediately there from adverse to the current controlling operation or operations for at least 60% of the total daily time being currently spent on the controlling operation or operations.

The controlling operation(s) is to be construed to include any feature of the work (e.g., an operation or activity, or a settlement or curing period) considered at the time by the City which will, if delayed or prolonged, delay the time of completion of the contract.

Determination that a day is a non-working day by reason of inclement weather or conditions shall be made by the City. The Contractor will be allowed 15 days in which to file a written protest stating how he differs from the City. Otherwise the decision of the City shall be deemed to have been accepted by the Contractor as correct. The City will furnish the Contractor a weekly statement showing the number of working days charged to the contract for the preceding week, the number of working days of time extensions being considered or approved, the number of working days originally specified for the completion of the contract, the number of working days remaining to complete the contract and the extended date for completion thereof, except when working days are not being charged in accordance with the provisions in §1-8.4, "Temporary Suspension of Work" of these specifications.

Should the Contractor prepare to begin work at the regular starting time in the morning of any day on which inclement weather, or the conditions resulting from the weather, or the condition of the work, prevents the work from beginning at the usual starting time and the crew is dismissed the Contractor does not proceed with at least 75% of the normal labor and equipment force engaged in the current controlling operation or operations for a least 60% of the total daily time being currently spent on the controlling operation or operations, the Contractor will not be charged for a working day whether or not conditions should change during the day and the major portion of the day is suitable for construction.

1-8.06 SUSPENSION OF CONTRACT

If at any time, in the opinion of the City, the Contractor has failed to supply an adequate working force, or material of proper quality, or has failed in any other respect to prosecute the work with the diligence and force specified and intended in and by the terms of the contract the written notice will be served and should he neglect or refuse to provide means for satisfactory compliance with the contract, as directed by the City, within the time specified in the notice then the City has the power to suspend the operation of the contract. Upon receiving notice of such suspension, the Contractor shall discontinue work or parts of it as per designation by the City.

Upon suspension, the Contractor's control shall terminate and the City may take possession of all or any part of the Contractor's materials, tools, equipment, and appliances upon the premises, and use the same for the purpose of completing the contract. The City may hire workers and buy or rent machinery, tools, appliances, equipment and supplies at the Contractor's expense as may be necessary for the proper conduct and completion of the work, or may employ other parties to carry the contract to completion, employ the necessary workmen, substitute other machinery or materials and purchase the materials contracted for in such manner as the City shall deem proper. The City may annul and cancel the contract.

Any excess cost arising over and above the contract price will be charged against the Contractor and his sureties. In the event of suspension, all payment due to the Contractor, or retained under the terms of the contract, shall be forfeited to the City. The forfeiture will not release the Contractor or his sureties from liability or failure to fulfill the contract. The Contractor and his sureties will be credited with the amount of money forfeited toward any excess cost over and above the contract price arising from the suspension of the operations of the contract and the completion of the work by the City. The Contractor will be credited with any surplus remaining after all just claims for completion have been paid. The determination of the City concerning noncompliance with the contracts as to warrant suspension or annulment shall be binding on all parties to the contract.

1-8.07 RIGHT-OF-WAY

Right-of-way easements for work will be provided by the City. The Contractor shall make his own arrangements and pay all expenses for additional areas required outside the limits of right-of-way or easements unless otherwise provided. In the event of delay on the part of the City, its officers, agents or employees in obtaining any right-of-way or easements for the work to be constructed, the Contractor shall have time for the completion of the contract for the period caused by the delay, but shall not have damages against the City, its officers, agents or employees.

1-8.08 DELAYS BY THE CITY OF CERES

Any act or omission of anything required to be done by the City, its officers, agents or employees, which shall cause the Contractor delay in the completion of the work shall be grounds for extension of time on the part of the Contractor to complete the work, but shall not give the Contractor damages for such delay

MEASUREMENT AND PAYMENT

1-9.01 MEASUREMENT

All work to be paid for at a contract price per unit of measurement shall be measured by the City in accordance with the United States Standard Measurements. A ton shall consist of 2,000 pounds avoirdupois. Material paid for by the ton shall be weighed on platform scales furnished by and at the expense of the Contractor, or on public scales. If weighed on scales furnished by the Contractor, the scales shall be acceptable to the City and shall be sealed by a representative of the State Division of Weights and Measures, at the expense of the Contractor, as often as the City may deem necessary to ensure accuracy. If weighed on public scales then the Contractor shall furnish weigh-master's Certificates to the City. (If material is shipped by rail then car weight will be accepted provided that actual weight of material only will be paid for.) Trucks used to haul material to be paid for by weight shall be weighed empty; each truck shall display a unique and non-interchangeable identifier.

Where payment is to be made on the basis of lump sum amounts measurement will not be made of included items for payment. Measurement to check compliance with the plans will be made. The Contractor shall submit a cost breakdown of their lump sum bid amounts for progress payment purposes. Partial progress payments will not be made for lump sum items without the cost breakdown being submitted.

1-9.02 SCOPE OF PAYMENT

The Contractor shall, until project acceptance by the City Council, accept the compensation as herein provided, as full payment for furnishing all materials, labor, tools, and equipment necessary to complete the work and for performing all work contemplated and embraced under the contract; also, for loss or damage arising from the nature of the work, or from the action of the elements, except as herein before provided, or from any unforeseen difficulties which may be encountered during the work and for all risks of every description connected with the work; also, for all expenses incurred in consequence of the suspension or discontinuance of the work; and for completing the work according to the plans and specifications.

Neither the payment of any estimate, nor of any retained percentage, shall relieve the Contractor of responsibility for faulty workmanship or materials. The Contractor shall remedy any defects due and pay for any damage to other work which shall appear within a period of 1 year from the date of the Notice of Completion and acceptance by the City Council. The City shall give notice of defects with reasonable promptness. All questions arising under this Section shall be answered by the City Engineer.

1-9.03 EXTRA AND FORCE ACCOUNT WORK

Extra work, when ordered and accepted, shall be paid for under a written change order in accordance with the terms provided. Payment for extra work will be made at the unit or lump sum price previously agreed upon by the Contractor and the City or by force account.

If the work is done on a force account basis then the Contractor will be paid the direct costs for labor, materials and equipment used in performing the work and determined as follows. To the total of the direct costs computed, there will be added a markup of 33% to the cost of labor, 15% to the cost of materials and 15% to the equipment rental. The above markups shall constitute full compensation for all overhead costs which shall be deemed to include all items of expense not specifically designated as cost or equipment rental. The total payment made as provided above shall be deemed to be the actual cost of the work and shall constitute full compensation.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in conformance with the provisions in §1-8.1, "Subletting and Assignment" of these specifications, an additional markup of 5% will be added to the total cost of that extra work including all markups specified in this Section. The additional 5% markup shall reimburse the Contractor for additional administrative costs, and additional payment will not be made by reason of performance of the extra work by a subcontractor.

A. **Labor:** The Contractor will be paid the cost of labor for the workers (including foremen when authorized by the City), used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor, subcontractor or other forces, will be the sum of the following:

1. Actual Wages - The actual wages paid shall include any employer payments to or on behalf of workers for health and welfare, pension and vacation.

2. Labor Surcharge - To the actual wages will be added a labor surcharge set forth in the State of California Department of Transportation publication entitled “Labor Surcharge and Equipment Rental Rates” which is in effect on the date upon which the work is accomplished and which is a part of the contract. The labor surcharge shall constitute full compensation for all payments imposed by state and federal laws and for all other payments made to, or on behalf of, workers, other than actual wages and subsistence and travel allowance.

3. Subsistence and Travel Allowance - The actual subsistence and travel allowance paid to the workers.

B. **Materials:** The City reserves the right to furnish any materials the City Engineer deems advisable, and the Contractor shall not have claims for costs and markup on those materials.

Only materials furnished by the Contractor and necessarily used in the performance of the work will be paid for. The cost of those materials will be the cost to the purchaser, whether Contractor, subcontractor or other forces except as the following are applicable:

1. If a cash or trade discount by the actual supplier is offered or available to the purchaser then it shall be credited to the City notwithstanding the fact that the discount may not have been taken.

2. If materials are procured by the purchaser by any method which is not a direct purchase from and a direct billing by the actual supplier to the purchaser then the cost of those materials shall be deemed to be the price paid to the actual supplier as determined by the City plus the actual costs, if any, incurred in the handling of the materials.

3. If the materials are obtained from a supply or source owned wholly or in part by the purchaser then the cost of those materials shall not exceed the price paid by the purchaser for similar materials furnished from that source on contract items or the current wholesale price for those materials delivered to the jobsite, whichever price is lower.

4. If the cost of the materials is, in the opinion of the City, excessive, then the cost of the material shall be deemed to be the lowest current wholesale price at which the materials were available in the quantities delivered to the jobsite, less any discounts.

C. **Equipment Rental:** The Contractor will be paid for the use of equipment at the rental rates listed for that equipment in the State of California Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates" which is in effect on the date upon which the work is accomplished and which is a part of the contract, regardless of ownership and any rental or other agreement, if they may exist, for the use of that equipment entered into by the Contractor, except that for those pieces of equipment with a rental rate of $10 per hour or less as listed in the Labor Surcharge And Equipment Rental Rates publication and which are rented from a local equipment agency, other than Contractor owned, the Contractor will be paid at the hourly rate shown on the rental agency invoice or agreement for the time used on force account work. If a minimum equipment rental amount is required by the local equipment rental agency then the actual amount charged will be paid to the Contractor.

If deemed necessary by the City to use equipment not listed in the Labor Surcharge and Equipment Rental Rates publication then a suitable rental rate for that equipment will be established by the City. The Contractor may furnish cost data which might assist the City in the establishment of the rental rate. If the rental rate established by the City is $10 per hour or less then the provisions concerning rental of equipment from a local equipment agency shall apply.

The rental rates paid provided shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance and all incidentals.

Operators of rented equipment will be paid for as provided above in Section A, "Labor." All equipment shall, in the opinion of the City, be in good working condition and suitable for the purpose for which the equipment is to be used. Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for the

determination of applicable rental rates. Equipment without direct power units shall be powered by a unit that has at least the minimum rating recommended by the manufacturer.

Individual pieces of equipment or tools not listed in the Labor Surcharge and Equipment Rental Rate publication and having a replacement value of $500 or less, whether or not consumed by use, shall be considered small tools and payment shall not be made.

Rental time will not be allowed while equipment is inoperative due to breakdowns.

All extra work done on a force account basis shall be recorded daily on report sheets made available by the City and signed by the Contractor. Daily reports shall be considered the true record of the extra work done. In the event of a dispute or failure of the Contractor to sign the daily reports, the Contractor shall have 7 calendar days to make a claim to the City in writing or the daily reports shall be the basis for payment.

When extra work is performed by subcontractors, the Contractor shall reach agreement with them as to the distribution of the payments made by the City, including the above percentages. Additional payment will not be made by the City by reason of the performance of the work by a subcontractor or other forces.

1-9.04 PROGRESS PAYMENTS

Each month, the City will make an estimate of the value of the work done on the contract between the 21st of the previous month and the 20th of the current month. Whenever the estimate of work done since the last previous estimate exceeds $1,000, 90% of the estimated sum will be paid to the Contractor on or before the 10th day of the following month.

The estimated value of work done may include 75% of the net invoice value of acceptable nonperishable material delivered to the work. The City shall retain 10% of the estimated value of the work completed done of the nonperishable material delivered to the work, as partial security for the fulfillment of the contract by the Contractor. After satisfactory completion of 75% of the contract work, the City may reduce the contract retention to 5%, provided the City has no outstanding claims against the Contractor.

Estimates from month to month will be approximate only and all monthly estimates and payments will be subject to correction in subsequent estimates, and the making of progressive payments shall not in any respect be taken as an admission of the City of the amount of work done or of its quality or sufficiency, nor as an acceptance of the work or release of the Contractor of any of his responsibility under the contract.

The Contractor will be allowed 15 days in which to protest in writing the correctness of the progress estimate; otherwise the progress estimate shall be deemed to have been accepted by the Contractor as correct.

No estimate or payment shall be made when, in the opinion of the City Engineer, the work is not proceeding in accordance with the provisions of the contract, or when the total value of the work completed since the last estimate is less than $1,000.

When the contract is a lump sum contract or includes lump sum items, the Contractor shall submit a cost breakdown for the City's approval before the first progress payment is made.

1-9.05 FINAL PROGRESS PAYMENT & CLAIM

The City shall, after completion of the work, make a final progress payment of the amount for the work done and the value of the work. The City shall pay 95% of the value after deducting all previous payments and all amounts to be retained under the contract. The payment of the retained amount shall be due and payable 35 days after recording the Notice of Completion and contract acceptance by the City Council.

The final progress payment shall be conclusive and binding against parties to the contract on all questions relating to the performance of the contract and the amount of work done and compensation, except in the case of gross error.

The Contractor agrees that the payment of the final amount due under the contract, and the adjustment and payment of any work done in accordance with any alternation of the same, shall release the City and its employees or agents, from any and all claims or liability on account of work performed under the contract or any alteration thereof.

The Contractor shall submit written approval of the final progress payment or a written statement of all claims arising under or by virtue of the contract so that the City Engineer receives written approval, or statement of claims, no later than the close of business of the 30th day after receiving the final progress payment. If the 30th day falls on a Saturday, Sunday or legal holiday, then receipt of written approval, or statement of claims, by the City Engineer shall not be later than the close of business of the next business day.

Claims filed by the Contractor shall be in sufficient detail to enable the City Engineer to ascertain the basis and amount. If additional information or details are required by the City Engineer to determine the basis and amount of the claims then the Contractor shall furnish further information or details so that the information or details are received by the City Engineer no later than the fifteenth day after receipt of the written request from the City Engineer. If the 15th day falls on a Saturday, Sunday or legal holiday then receipt of the information or details by the City Engineer shall not be later than the close of business of the next business day. Failure to submit such information and details to the Engineer within the time specified will be sufficient cause for denying the claim.

The Contractor shall keep full and complete records of the costs and additional time incurred for any work for which a claim for additional compensation is made. The City Engineer or any designated claim investigator or auditor shall have access to those records and any other records as may be required by the City Engineer to determine the facts or contentions involved in the claims. Failure to permit access to records shall be sufficient cause for denying the claims.

Claims submitted by the Contractor shall be accompanied by a notarized certificate containing the following language:

Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code §12650 et. seq., the undersigned

_____,
(Name)
_____ of
(Title)
_____,
(Company)

hereby certifies that the claim for the additional compensation and time, if any, made herein for the work on this contract is a true statement of the actual costs incurred and time sought, and is fully documented and supported under the contract between parties.

Dated_____

_____

Subscribed and sworn before me this _____ day of

_____.

_____

_____

Notary Public My Commission Expires _____

Failure to submit the notarized certificate will be sufficient cause for denying the claim. Any claim for overhead type expenses or costs, in addition to being certified as stated above, shall be supported by an audit report prepared by an independent Certified Public Accountant. Any overhead claim shall also be subject to audit by the City at its discretion. Costs or expenses incurred by the City in reviewing or auditing any claims that are not supported by the Contractor's cost accounting or other records shall be deemed to be damages incurred by the City within the meaning of the California False Claims Act. The City Engineer will make the final determination of any claims. A board or person designated by the City Engineer will review claims and make a written recommendation to the City Engineer. The Contractor may meet with the review board or person to make a presentation in support of the claims.

1-9.06 INCREASED OR DECREASED CONTRACT QUANTITIES

Whenever an item of work or materials is specified in the contract by unit prices and is changed, but by not more than 25% of the Engineers' estimate of that bid item quantity as specified in the Proposal Form, the contract price shall be increased or decreased by the specified unit prices.

Whenever a contract item increases or decreases in quantity by more than 25%, the addition or subtraction from the contract price shall be established in accordance with §4-1.03, "Changes" of the State Standard Specifications.

Substitution of Securities for Withheld Payments

Except as otherwise prohibited by law, the Contractor may elect to receive all payments due under the contract without retention pursuant to §9.05 and §9.08 of these specifications. As provided in §22300 of the California Public Contract Code, at the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the City, or with a State or federally chartered bank as the escrow agent. The Contractor may request and the City shall make payment of retentions earned directly to an escrow agent in accordance with the provisions of §22300 of the California Public Contracts Code. Upon satisfactory completion of the contract, the funds shall be released to the Contractor. The term "satisfactory completion of the contract" shall include the filing of a Notice of Completion and the retention of the funds for a period of 35 days thereafter.

Any of the following securities, which shall be approved by the City's Director of Finance, are eligible for investment under Section 22300 of the California Public Contracts Code.

a. securities eligible for investment under Government Code §16430

b. certificates of deposit issued by banks authorized to transact business in California which are members of the Federal Deposit Insurance Corporation, or by savings and loan associations authorized to transact business in California which are members of the Federal Savings and Loan Insurance Corporation

c. interest bearing demand deposit accounts

d. standby letters of credit.

1-9.07 RIGHT TO WITHHOLD AMOUNTS

In addition to the amount which the City may otherwise retain under the Contract, the City may withhold a sufficient amount or amounts of any payment or payments otherwise due the Contractor, as in its judgment may be necessary to cover:

a. payments which may be past due and payable for just claims against the Contractor or any subcontractor for labor or materials furnished for the performance of this Contract

b. for defective work not remedied

c. for failure of the Contractor to make proper payments for the use of temporary utilities

d. failure of the Contractor to make proper submissions, as herein specified

e. failure to submit certified payrolls, when requested

f. Failure to submit, revise, resubmit or otherwise conform to the requirements herein for work scheduling.

The minimum amount to be withheld will be $1,000 for each of the above reasons or the estimated value of the work involved in resolving the problem. When the above reasons for withholding amounts are removed, payment will be made to the Contractor for amounts withheld because of them on the next regularly scheduled progress payments.

The City may apply any withheld amount or amounts to the payment of valid claims. In so doing, the City shall be deemed the agent of the Contractor for these purposes only, and any payment made by the City shall be considered as a payment made under the contract by the City to the Contractor, and the City shall not be liable to the Contractor for such payment made in good faith. Payments may be made without prior judicial determination of the claim or claims. The City will render to the Contractor an accounting of funds disbursed on behalf of the Contractor.

1-9.07 DISPUTE RESOLUTION

All claims, controversies, or disputes, including claims, controversies, or disputes asserted by the City against the Contractor pursuant to the False Claims Act, Government Code §12650 et. seq., not settled by the City, arising out of, or relating to the contract, or the breach, termination, enforcement, interpretation, or validity of the contract, including the determination of the scope or applicability of this specification shall be determined by binding arbitration in Ceres, California by one arbitrator. The arbitrator is specifically empowered to determine any and all claims, controversies, or disputes asserted by the City against the Contractor pursuant to the False Claims Act. The American Arbitration Association shall administer the arbitration under its Construction Industry Arbitration Rules then in effect, subject to the modifications of those rules contained in this specification. This agreement to arbitrate shall be specifically enforceable under the prevailing law of any court having jurisdiction, and the award rendered by the arbitrator may be entered in any court having jurisdiction. The appropriate venue for any arbitration under this specification shall be in Stanislaus County, California.

This specification is not intended to and does not waive the claim filing requirements found in California Government Code §900, et seq. In the event that a timely and legally sufficient claim that can be arbitrated is filed by the Contractor with the City, and the claim is rejected in whole or in part by the City, this specification shall result in the conclusive, final, and binding resolution of all the issues presented in the claim so long as any issues presented by the claim can be arbitrated. Claims rejected by the City, or by operation of law, shall be submitted by the Contractor to arbitration pursuant to the Construction Industry Arbitration Rules of the American Arbitration Association

within 90 days after mailing of the written rejection by the City to the Contractor. Otherwise, the claim or claims shall be deemed waived in their entirety. The Contractor may submit to arbitration by advising the City Clerk in writing of his desire to arbitrate within the 90 day period, and thereafter following Association rules in good faith.

The "fast track" rules of the American Arbitration Association shall apply to any claim or counterclaim less than $150,000. In arbitration not proceeding under the "fast track" rules, the arbitrator shall have the power to order that depositions be taken and other discovery be made. Both the City and the Contractor shall have the right, upon written notice, to take no more than three depositions of the other as a matter of right in an arbitration not proceeding under the "fast track" rules.

Whether or not the City and the Contractor may be engaged in interstate commerce, any controversy or dispute mentioned above shall be determined by, and the parties shall be bound by, the substantive law of the State of California, and not the Federal Arbitration Act (9 USC §1, et seq.)

The arbitrator may grant any remedy or relief deemed by the arbitrator just and equitable under the circumstances, whether or not such relief could be awarded in a court of law. Notwithstanding anything in this specification to the contrary, the arbitrator shall not have the power to award attorney's fees and cost to any party. Each party is to bear their own attorney fees and costs.

Notwithstanding anything in this specification to the contrary, the arbitrator shall not have the power to award punitive damages or other damages not measured by the party's actual damages against any party. This limitation of the arbitrators' powers under this Contract shall not operate as an exclusion of the issue of punitive damages from this Contract to Arbitrate sufficient to vest jurisdiction in a court with respect to that issue. The Contractor shall include in all subcontracts a specification whereby the subcontractor consents to being joined in arbitration between the City and the Contractor involving the work of the subcontractor. The Contractor's failure to do so shall be a breach of the Contract. The parties to any Contract of which this specification is made a part by reference or otherwise shall, and hereby do, waive any rights provided by Title 9.2 of the California Code of Civil Procedure, §1296. The arbitrators' award shall be deemed final, conclusive and binding to the fullest extent allowed by California law.

CHAPTER - 2

EARTHWORK

2-1.01 GENERAL

A. Requirement

1. The contractor shall provide all materials, equipment and labor necessary to furnish and construct the earthwork and all appurtenant work, complete and in place, as shown on the approved project plans and as specified herein.

2. Work covered in this section:

   a. site clearing

   b. preparation for fill material

   c. excavation

   d. grading and compaction

   e. utility trenching.

B. Reference Specifications, Codes, and Standards

1. Caltrans Standard Specifications

   Section 16 – Clearing and Grubbing
   Section 19 – Earthwork
   Section 25 – Aggregate Subbases
   Section 26 – Aggregate Bases
   Section 68 – Subsurface Drains
   Section 88 – Engineering Fabrics

2. California Building Code

3. Commercial Standards

   ASTM C 117 - Test Method for Materials Finer than 75-µm (No. 200 Sieve) in Mineral Aggregates by Washing.

   ASTM C 136 - Method of Sieve Analysis of Fine and Coarse Aggregates

ASTM D 422 - Test Method for Particle-Size Analysis of Soils

ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method

ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soils-Aggregate Mixtures using a 10 pound rammer and an 18 inch Drop

ASTM D 1633 - Test Methods for Comprehensive Strength of Molded Soil-Cement Cylinders

ASTM D 2419 - Method for Sand Equivalent Value of Soils and Fine Aggregate

ASTM D 2487 - Test Method for Classification of Soils for Engineering Purposes

ASTM D 3776 - Test Methods for Mass per Unit Area of Woven Fabric

ASTM D 3786 - Method of Hydraulic Bursting Strength of Knitted Goods and Non-woven Fabrics: Diaphragm Bursting Strength Tester Method

ASTM D 4253 - Test Methods for Maximum Index Density of Soils using a Vibratory Table

ASTM D 4254 - Test Methods for Minimum Index Density of Soils and Calculation of Relative Density

ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 4491 - Test Methods for Water Permeability of Geotextiles by Permittivity

C. Contract Submittals

1. **Shoring and Bracing Drawings** (Reference: §6705 of the California Labor Code) The contractor, prior to beginning any trench or structure excavation 4 feet deep or more, shall submit to the City Engineer for review, a detailed plan showing the design of all shoring, bracing, sloping of the sides of the excavation and or other provisions for worker protection against the hazard of caving. The contractor shall adhere to shoring system standards established in the Construction Safety Orders of the State of California. The plans and details shall be prepared, stamped and signed by a civil or structural engineer licensed in the State of California and shall be done at the contractor's expense.

2. **Certificates of Compliance** Certificates of Compliance shall be provided for all proposed products and materials.

D. Quality Assurance

1. All soil testing will be done by a testing laboratory approved by the City Engineer and at the City's expense; except as otherwise provided for in this specification.

2. The City will pay the cost of the first test. Subsequent re-testing to show compliance shall be at the Contractor's expense.

3. Where native earth materials are to be compacted to a percentage of maximum density the maximum density at optimum moisture content shall be determined in accordance with ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density the calculation of relative density shall be determined in accordance with ASTM D 4253 and D 4254. Field density tests shall be performed in accordance with ASTM D 2922, or by other methods approved by the City Engineer.

4. If the tested materials show non-compliance with compaction requirements then the Contactor shall rework the material as required. Re-work may require excavation, moisture conditioning and backfill of previously placed material.

5. The contractor shall notify the City Engineer at least 48 hours prior to performing any site clearing, grubbing, or stripping; the contractor shall receive written approval before proceeding.

6. Finish subgrade at any point shall not vary more than 0.1 foot from the subgrade shown on the approved plans.

E. Project Conditions

1. Material for embankments shall consist of suitable excavated material if available and approved for use by the project soils engineer. Alternatively, import may be required that conforms to the requirements of this specification and the project soils report.

2. The contractor is responsible for the maintenance of the graded surface at all times including implementation of all erosion control measures shown on the approved plans and as required by all governing agencies.

3. The contractor is responsible for providing proper drainage at all times as shown on the approved grading and erosion control plans and as required by all governing agencies.

2-1.02 MATERIALS

A. Suitable Fill

1. Import shall consist of inert, non-expansive soil and rock fragments and shall conform to the requirements of the project soils report.

2. All fill, import or native, shall be free of organic materials, trash and debris, moderately to highly expansive clays, or any other deleterious materials, and is subject to the approval of the City Engineer.

3. The top 2 feet of import below the subgrade for the roadway shall conform to the following requirements:

   a. Fill shall conform to the following as determined by ASTM C 117 and ASTM C 136:

Maximum Particle Size	3 inches
Percent passing 1 inch sieve	90-100 percent
Percent passing No. 200 sieve	less than 20 percent

   b. The Plasticity Index shall be a maximum of 15 as determined by the procedure set forth in ASTM D 4318.

   c. The Liquid Limit shall not exceed 40 percent as determined by the procedure set forth in ASTM D 4318.

   d. Import fill material shall have an R-value of 25 or greater as determined by ASTM D 2844.

4 The contractor shall submit to the City Engineer the proposed source of import along with a soils report and certification from the designated source that the proposed source materials conform to this specification. The report shall be submitted at least 10 working days before the proposed use date.

5 All suitable native fill containing clods or hard lumps of earth over 4 inches in diameter shall be broken up before compaction. All suitable native fill consisting of large rocky material or hard lumps, such as hardpan or cemented gravel, which can not be broken readily, shall be well distributed in the lower portions of the fill when approved by, and under the direction of, the project soils engineer.

B. Suitable Backfill

1. Suitable backfill shall be a select or processed clean native earth material free from organics or other deleterious substances.

2. The following types of backfill are designated and defined as follows:

Type 1-Sand: Shall be sub-angular to angular with 100 percent passing a 3/8-inch sieve, at least 90 percent passing a No. 4 sieve, and a sand equivalent value of not less than 30.

Type 2-Class 2 Aggregate Base: Shall be crushed rock aggregate base meeting the requirements of Section 26 *Aggregate Bases* for 19 millimeter maximum grading, of the State Standard Specifications.

Type 3-Class 1 Permeable Material: Shall be crushed stone, or gravel, durable and free from slaking or decomposition under action of alternate wetting or drying, shall be uniformly graded, and shall meet the requirements of Section 68-1.025 for *Class 1 Permeable Material* of the State Standard Specifications.

Type 4-Class 2 Permeable Material: Shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying, shall be uniformly graded, and shall meet the requirements of Section 68-1.025 for *Class 2 Permeable Material* of the State Standard Specifications.

Type 5-Manufactured Backfill: Shall be manufactured, sub-angular to angular, granular, crushed stone or rock with 100 percent passing a one inch sieve and less than one percent passing a No. 4 sieve.

Type 6-: Blank

Type 7-Native Material: Shall be clean material obtained from on-site excavations, provided the materials are not classified as unsuitable. Native material shall be free of stones, lumps, broken concrete or bituminous surfacing over 4 inches in diameter, objectionable material, vegetation, and deleterious substances.

Type 8-Topsoil: May be material which has been obtained at the site or may be imported, and shall meet the requirements of these specifications.

Type 9-Aggregate Subbase: Shall conform to the grading and quality requirements of Section 25, *Class 2 Aggregate Subbase* of the State Standard Specifications.

C. Unsuitable Backfill

1. Unsuitable soils for backfill shall include soils which, when classified under ASTM D 2487 are Pt, OH, or OL. Types CH and MH soils will be permitted in unimproved

areas only where required compaction and stability can be demonstrated. Any soil which cannot be compacted sufficiently to achieve the percentage of maximum density specified for the intended use, shall be classified as unsuitable material.

2. Any material determined to be hazardous is defined as unsuitable material.

3. Washed, smooth rock (pea gravel) is classified as unsuitable material.

4. If the moisture content of the material is not in conformance with Section 19 Earthwork, of the State Standard Specifications then the material is unsuitable.

D. Use of Suitable Backfill

1. The contractor shall use the types of materials as designated herein for all backfill.

2. Backfill shall be used in conformance with the following provisions:

a. Bedding backfill, as defined under this specification shall be sand, Class 2 Aggregate Base, Class 1 Permeable Material or Class 2 Permeable Material

b. Pipe Zone backfill, exclusive of bedding, shall be as follows:

i. Plastic pipe shall be backfilled with Sand meeting the requirements of Product Type 1.

ii. Mortar coated pipe, concrete pipe, and ductile iron pipe shall be backfilled with Sand, Class 2 Aggregate Base Backfill Material, crushed rock or gravel; all shall meet the requirements of Product Types 1, 2, 3 or 4.

iii. Coal tar enamel coated pipe, polyethylene encased pipe, and other non-mortal coated pipe shall be backfilled with Sand or natural, rounded, non-crushed material; all shall meet the gradation requirements of Product Types 1, 2, 3 or 4.

iv. Vitrified clay pipe shall be backfilled with Sand, or Manufactured Backfill material, meeting the requirements of Product Type 1 or 5, or Class 2 Aggregate Base, Class 1 Permeable Material or Class 2 Permeable Material; all shall meet the requirements of Product Types 2, 3 or 4, only if properly compacted with hand tampers or vibratory compactors.

v. Backfill for sub-drainage systems shall be designed on a case-by-case basis. The pipe zone backfill for all other pipeline excluding those listed above shall be Sand, Class 2 Aggregate Base, Class1 Permeable

Material, Class 2 Permeable Material or Manufactured Backfill; all shall meet the requirements of Product Types 1, 2, 3, 4 or 5

Note: Where pipelines are installed on grades exceeding 4 percent, and where backfill materials are graded such that there is less than 10 percent passing a No. 4 sieve, trench plugs of impermeable clay type material or concrete shall be provided at a maximum spacing of 200 feet on center.

c. Trench Zone backfill shall be Sand, Class 2 Aggregate Base, Class 1 Permeable Material, Class 2 Permeable Material, Manufactured Backfill, Native or Aggregate Subbase; all shall meet the requirements of Product Types 1, 2, 3, 4, 5, 7 or 9.

d. Final Zone backfill shall consist of the following materials for each condition listed below:

i. Final Zone Backfill under paved areas shall be Class 2 Aggregate Base or Class 2 Aggregate Subbase, meeting the requirements of Product Types 2 or 9

ii. Final Zone Backfill in unimproved areas shall be Native or Class 2 Aggregate Subbase meeting the requirements of Product Types 7 or 9

iii. Final Zone backfill in landscape areas shall be Native meeting the requirements of Product Type 7. Topsoil shall be product Type 8

iv. Final Zone backfill under graveled roads shall be Class 2 Aggregate Base, Native, or Class 2 Aggregate Subbase meeting the requirements of Product Types 2, 7 or 9

v. Backfill materials around minor structures shall be any Trench Zone Product Type except Sand, Native, or Topsoil, Product Types 1, 7 or 8

vi. Over-excavation backfill shall be Class 2 Permeable Material meeting the requirements of Product Type 3. For wet trench conditions place a filter fabric at the top and bottom of the permeable material to attenuate the migration of fines.

E. Filter Fabric

1. Filter fabric shall be non-woven synthetic fabric meeting the requirements of Section 88-1.03, Filter Fabric, of the State Standard Specifications. Filter fabric shall be non-woven synthetic fabric with a minimum grab strength of 90 pounds; a minimum

burst strength of 180 pounds, a minimum puncture strength of 50 pounds; a water flow rate of at least 40 gal/min/sf, and an apparent opening size between 60 and 110.

F. Steel Plate

a. When steel plate bridging is provided in-lieu of backfill and temporary asphalt, it shall conform to Section 602.1 of the Caltrans Encroachment Permit Manual, with the following minimum thickness:

Table 2.1 – Trench Width and Steel Plate Thickness

Maximum Trench Width	Minimum Plate Thickness
10 inches	½ inch
1 foot 6 inches	¾ inch
2 feet, 6 inches	7/8 inch
3 feet, 6 inches	1 inch
5 feet, 6 inches	1- ¼ inch

For spans greater than 5 feet, 6 inches, a structural design shall be prepared by a California registered civil engineer.

2-1.03 EXECUTION

A. Site Clearing, Grubbing, and Stripping

1. Clearing and grubbing shall conform to Section 16, Clearing and Grubbing, of the State Standard Specifications and this specification.

2. Unless otherwise shown on the approved plans, clearing and grubbing shall be performed within the entire street right-of way. Burning of material is not allowed.

3. The site shall be stripped and cleared of all vegetation, debris, and organic-laden top soil as required by the project soils engineer. The stripped material shall be removed from the site or stockpiled for landscaping purposes if allowed by the project soils engineer. The material shall not be used as import.

4. No clearing or grubbing of the site can take place until an environmental review has been completed and approved by governing agencies.

B. Preparation for Fill Material

1. Prior to placing import, all areas to receive fill shall be scarified and compacted. Unless otherwise stated in the project soils report, the area shall be scarified to a minimum of 8 inches, the material shall be moisture conditioned by wetting or drying

to a range between 2 percent to 5 percent over optimum moisture content, and compacted to a density or not less than 90 percent relative compaction in conformance with ASTM D1557.

C. Grading and Compaction

1. Grading shall consist of grading the site to the lines and grades specified on the approved project plans. Roadway grading, placing and compacting shall conform to Section 19-5, Compaction, and Section 19-6, Embankment Construction, of the State Standard Specifications.

2. Damage to underlying native soil caused by the contractor's operations shall be repaired and re-compacted under the direction of the project soils engineer and to the satisfaction of the City Engineer and at no additional cost to the City.

3. Material for fill shall be placed in the lifts or horizontal layers not exceeding 8 inches in un-compacted thickness. Unless otherwise specified in the project soils report, fill shall be moisture conditioned by wetting or drying and compacted to a density of not less than 90 percent relative compaction in conformance with ASTM D 1557. The upper 2 feet below street subgrade for the width of the traveled way shall be compacted to a density of not less than 95 percent relative compaction in conformance with ASTM D 1557.

4. Final preparation of street subgrade shall be in conformance with these specifications.

D. Excavation

1. Excavation shall conform to Section 19.1, General and Section 19-2, Roadway Excavation of the State Standard Specifications, except the reference to Section 19-5, Compaction, is deleted, and Section 19-2.02, Unsuitable Material, is modified as follows:

   a. When directed by the City Engineer, the contractor shall excavate the unstable or unsuitable underlying material to the depth determined by the project soils report.

   b. Subgrade shall be prepared in conformance with these specifications.

E. Underground Structure

1. Abandoned underground structures and pipelines encountered in street areas shall be removed to a sufficient depth to allow underground lines to cross and for backfill and compaction to be completed during rough grading. The City Engineer may require additional work if warranted based on inspection during construction.

F. Pipeline and Utility Trench Excavation

1. **Trench Width:** Unless otherwise shown on the approved plans or directed by the City Engineer, excavation for pipelines and utilities shall be open-cut trenches. Trench width shall be kept as narrow as is practical for the method of compaction selected by the contractor, but shall have a minimum width at the bottom of the trench equal to the outside diameter of the pipe plus 24 inches. The maximum width at the top of the pipe shall be equal to the outside diameter of the pipe plus 36 inches for pipe diameters 18 inches and larger, and to the outside diameter of the pipe plus 24 inches for pipe diameter less than 18 inches. For deep trenches, the maximum width requirement may be waived for constructability reasons with the written approval of the City Engineer. For telecommunications conduit (electrical, telephone, cable TV/communication conduits), street light and traffic signal conduits, the width of the trench shall be sufficient to ensure proper compaction of the trench backfill.

2. **Subgrade:** The surface of the subgrade after compaction shall be capable of supporting anticipated loads and the surface shall be uniform, smooth, self draining, and true to grade and cross section as shown on the approved plans.

3. **Trench Bottom:** The pipe bedding shall be given a final trim establishing grade so that the pipe contacts the bedding along the bottom of the pipe. Rounding out the trench bottom or bedding to form a cradle for the pipe is not allowed. The contractor shall excavate for bell holes and fittings.

4. **Open Trench:** The maximum amount of open trench permitted in any one location shall be the length necessary to accommodate the amount of pipe installed and backfilled in a single day. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by steel plates capable of supporting vehicular traffic (HS-20 loading). These requirements for backfilling or use of steel plate may be waived by the City Engineer where the trench is located further than 100 feet from any traveled roadway or occupied structure. In this circumstance barricades and warning lights shall be provided and maintained by the contractor at his expense. The contractor shall be responsible for any sloughing, caving or collapse that may occur.

5. **Over-excavation:** When directed by the City Engineer and whether or not indicated on the approved plans, trenches shall be over-excavated beyond the depth shown to the depth specified. The trench shall be backfilled to the grade specified on the approved plans.

6. **Pipelines:** Where pipelines are to be installed in embankment or structure fills, the fill shall be constructed to a level minimum of 2 feet above the top of the pipe, as directed by the City Engineer, or as recommended by the pipe manufacturer, wherever is greater, before the trench is excavated.

G. Over-Excavation not Ordered, Specified, or Shown

1. Any over-excavation carried below the grade ordered, specified, or shown on the approved plans, shall be backfilled to the required grade and compacted with the specified material and compaction. This work shall be performed by the contractor at his expense.

H. Excavation in Lawn Areas

1. Prior to excavation in lawns, the sod shall be carefully removed, watered and preserved for replacement. Excavated material may be placed on the lawn at the contractor's risk. The lawn shall not remain stockpiled for more than 48 hours. Immediately after completion of backfilling and testing of the trench, the sod shall be replaced to restore the lawn. The contractor shall provide new sod if the removed sod has been stockpiled for more than 48 hours or has been damaged (as determined by the City Engineer) due to the contractor's operations.

2. All disturbed or affected landscaping shall be replaced in kind and as shown on the approved plans or as directed by the City Engineer. All damaged irrigation systems, including piping and electrical wiring, shall be repaired and operating properly the same day as damaged.

I. Excavation in the Vicinity of Trees

1. Except where trees are shown to be removed, trees shall be protected from injury during construction. Protective fencing shall be installed as specified in the project arborist report prior to any excavation in the vicinity of the trees to be protected. No parking of equipment or material stacking shall be permitted within the root zones. No trees roots over 2 inches in diameter shall be cut without the approval of the project arborist or the City Engineer. Trees shall be supported during excavation.

2. Roots shall be cut and not ripped by grading equipment.

3. If existing roots over one inch in diameter are cut during the course of the work then the cut faces shall be coated with emulsified asphalt made specifically for use on cut or damaged plant tissues. Exposed roots shall be covered with wet burlap to prevent them from drying out and the burlap shall be wetted as required so that the roots are kept moist.

J. Rock Excavation

1. Rock excavation shall include removal and disposal of the following:

a. all boulders measuring 1/3 of a cubic yard or more in volume

b. all rock material in ledges, bedding deposits, and non-stratified masses

c. concrete or masonry structures which have been abandoned

d. conglomerate deposits which exhibit the characteristic of solid rock.

2. Explosives and Blasting

The use of explosives and blasting shall not be permitted on City projects.

K. Disposal of Excess Excavated Material

1. The contractor shall dispose of all excess excavated material to a suitable site. The proper and legal disposal is the responsibility of the contractor. The contractor shall provide proof of the same to the City Engineer.

L. Backfill - General

1. Backfill shall not be dropped upon structures or pipes. Backfill shall not be placed around or upon any structure for a minimum of 72 hours or until the concrete has attained the design strength required to withstand the loads imposed, whichever is greater. The project engineer shall provide written authorization to load the structure for any time that is less than 1 week after concrete placement; a copy of the authorization shall be submitted to the City.

2. Except for Product Type 3 material being placed in over-excavated areas or trenches backfill shall not be placed until water has been removed from excavations.

M. Pipe and Utility Trench Zones and Backfill

1. Pipe Zone and Backfill

a. The Pipe Zone is defined as that portion of the vertical trench cross-section lying between a horizontal plane 6 inches below the bottom surface of the pipe, i.e. the trench subgrade, and a horizontal plane at a point 12 inches above the top surface of the pipe.

b. The Pipe Zone shall be backfilled with the specified backfill material. The contractor shall not damage to the pipe coating, cathodic bonds, and the pipe during installation and backfill.

2. Bedding: The bedding is that portion of the Pipe Zone lying between a horizontal plane 6 inches below the bottom surface of the pipe, and a horizontal plane even with the bottom of the pipe; or as otherwise defined by the pipe manufacturer.

a. Bedding shall be provided for all pipes.

b. After compacting the bedding the contractor shall perform a final trim for establishing grade so that the pipe, when first laid, will be in contact with the bedding along the bottom of the pipe.

3. Trench Zone and Backfill: The Trench Zone is that portion of the trench between a horizontal plane 12 inches above the top of the pipe and a horizontal plane 24 inches below the roadway subgrade in paved areas, or 24 inches below the finished surface in landscaped and unimproved areas.

   After the Pipe Zone backfill has been placed and after all water has drained from the trench, backfilling of the Trench Zone may proceed.

4. Final Zone and Backfill: The final Zone is the top 24 inches between the top of the Trench Zone and the roadway subgrade in paved areas, and the top 24 inches of the vertical trench cross-section lying between the top of the Trench Zone and the finish grade in landscaped and unimproved areas.

5. Utility Crossing: For any new pipeline installation that crosses under existing electric, gas, telephone, cable TV utility pipe(s) or conduit(s) the contractor shall replace the existing backfill around the existing utility pipe(s) or conduit(s) with PG&E Sand. PG&E Sand shall be placed from a horizontal plane 6 inches below the bottom of the lowest utility pipe or conduit to a horizontal plane 12 inches above the top of the highest utility pipe or conduit, and for the full width of the trench. PG&E Sand backfill shall be compacted to 95 percent maximum density in conformance with Compaction of Backfill Materials as presented below.

N. Placing and Spreading of Backfill

1. Backfill shall be placed in horizontal layers and shall not exceed 6 inches in un-compacted thickness.

2. During spreading each layer shall be mixed to ensure uniformity of both material and moisture content. Pipe Zone backfill shall be manually spread around the pipe so that when compacted the Pipe Zone backfill will provide uniform bearing.

3. If the backfill moisture content is below the optimum moisture content then water shall be added before or during spreading until the proper moisture content is achieved.

4. If the backfill material moisture content is too high to permit the specified degree of compaction then the material shall be dried until the moisture content is satisfactory.

5. Backfill shall be mechanically compacted by means of tamping rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers.

6. Material for mechanically compacted backfill may be placed in loose lifts which, prior to compaction, shall not exceed the thickness specified below for various types of equipment:

   a. Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers - maximum lift thickness of 6 inches.

   b. Rolling equipment, including sheep-foot (both vibratory and non-vibratory), grid, smooth-wheel (non-vibratory), pneumatic (non-vibratory), and segmented wheels - maximum lift thickness of 6 inches.

   c. Hand-directed mechanical tampers - maximum lift thickness of 4 inches.

O. Compaction of Backfill Materials

1. Each layer of backfill shall be compacted to the specified percentage of maximum density. Each layer shall be compacted over its entire area while the moisture content of the material is within the required range.

2. Jetting may be used where approved by the City Engineer.

3. Hand operated power compaction equipment shall be used when directed by the City Engineer and where the use of heavier equipment is contra-indicated by weight limitations.

4. Compaction Requirements: The following compaction tests shall be in accordance with ASTM D 1557 for cohesive type materials and in accordance with ASTM D 4253 and D 4254 for "non-plastic" cohesionless free draining granular type materials. If other agency or utility company requirements govern then the most conservative standards shall apply:

Table 2.2 - Fill Density Requirements

Location or Use of Fill	Percentage of Maximum Density	Percentage of Relative Density
Pipe Zone backfill including bedding and over-excavated zone.	90	65
Final Zone backfill beneath paved areas or structures.	95	70
Final Zone backfill beneath unpaved access areas, landscape, or unimproved areas.	90	55
Trench Zone backfill	90	65

Backfill beneath minor structures	95	70
Backfill around minor structures	90	65

Maximum Density refers to maximum dry density according to ASTM D 1557 laboratory test procedures. Percentage of Relative Density refers to ASTM D 4253 and ASTM D 4254 laboratory test procedures. Relative density should only be used for "non-plastic" cohensionless, free draining, granular-type material.

5. Trench Backfill Requirements: The pipe class has been structurally designed based upon the trench configuration previously specified.

   a. The contractor shall maintain the previously specified trench width up to a horizontal plane located 12 inches above the top of the pipe.

   b. If, at any location under the horizontal plane specified above, the contractor slopes the trench walls or exceeds the maximum trench width indicated then the Pipe Zone backfill shall be improved at no additional cost to the City. "Improved" backfill is select import approved by the City Engineer.

   c. If the allowable deflection specified for the pipe is exceeded then the contractor shall expose and re-round or replace the pipe, repair all damaged lining and coating, and reinstall the Pipe Zone material and Trench Zone Backfill as specified.

   d. All trenches in roadways shall have a minimum of 2 inches of temporary asphalt placed daily and maintained unless final paving can be completed in the same day. Temporary asphalt shall be placed flush with the adjacent pavement grade. Steel plates may be used to cover open trenches in-lieu of backfill and temporary asphalt pavement.

P. Steel Plate

1. If backfilling in the roadway, whether transverse or longitudinal, cannot be properly completed within a work day then steel plate bridging with a non-skid surface (and shoring as warranted) is required to preserve traffic flow.

2. When steel plate bridging is required, the following conditions shall apply:

   a. Steel plated used for bridging must extend a minimum of 12 inches beyond the edges of the trench.

   b. Steel plate bridging shall be installed to minimum the potential for noise.

   c. The trench shall be adequately shored to support the bridging and traffic loads.

d. Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates.

e. Bridging shall be secured against displacement by using adjustable cleats, shims, or other devices.

3. Steel plate bridging and shoring shall be installed using either Method 1 or Method 2 below:

a. Method 1 for speeds greater than 45 mph: The pavement shall be cold planed to a depth equal of the thickness of the plate.

b. Method 2 for speeds equal to or less than 45 mph: The approaching plate and the ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two, one inch diameter steel dowels pre-drilled into the corners of the plate and drilled 2 inches into the pavement. Adjacent plates are butted. Fine graded asphalt concrete shall be compacted to form ramps with a maximum slope of 8.5 percent and with a minimum 12 inch taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with graded fines, an asphalt concrete mix, concrete slurry or an equivalent slurry.

4. The use of steel plate bridging at any specific location shall not exceed 4 consecutive working days in any given week.

2-1.04 MEASUREMENT AND PAYMENT

A. Site Clearing, Grubbing, and Stripping
Site Clearing, Grubbing, and Stripping shall be measured on a lump sum basis. Payments shall be made at the contract bid price and shall include the furnishing of all labor, materials, water, tools, and equipment required to complete the work in accordance with the approved plans and these specifications.

B. Grading
Landscape grading shall be measured for payment by the cubic yard of excavation and backfill. Payment shall be made at the contract bid price and shall include the furnishing of all labor, materials, water, tools, and equipment required to construct and complete soil preparation, grading, excavation, backfill, and compaction in accordance with the approved plans and these Specifications.

C. Utility Trenching
All utility trenching including excavation, backfill, compaction, and steel plating shall not be measured. Payment for these items is included in the payment method described for each underground utility in these specifications.

CHAPTER - 3

STORM DRAIN

3-1.01 GENERAL

This work includes the furnishing of all the labor, excavation, bedding, backfill, materials, tools, and equipment required to construct and complete all drainage facilities in accordance with accepted engineering principles, the approved plans, the Standard Details and these specifications.

3-1.02 MATERIALS

A. The City Engineer shall approve the source and supply of materials as per Section 1-5 of the State Standard Specifications.

B. Reinforced Concrete Pipe (RCP)

Reinforced Concrete Pipe shall conform to the specifications of ASTM C76 and shall be Class III, IV or V unless otherwise specified on the approved plans. Reinforcing shall meet the requirements for circular reinforcing wire mesh as specified in ASTM C76. Portland Cement used in the manufacture of reinforced concrete pipe shall conform to the requirements of Type II Portland Cement as per ASTM C150.

C. High Density Polyethylene Pipe (HDPE)

Solid pipe and fittings shall be high density, high molecular weight polyethylene HDPE virgin compound material meeting the requirements of the cell class outlined in ASTM D 3350. Manufacturing shall meet the requirements of ASTM F 2306.

D. Type PSM Poly Vinyl Chloride Pipe (PVC)

PVC pipe shall meet the requirements of ASTM D3034-SD35 with ring-tight joints

E. Manhole and Junction Boxes

1. Manhole frames and covers shall be South Bay Foundry 24 inch diameter, or an approved equal.

2. The cover and frame shall be cast ductile iron.

3. Frames shall be circular, shall include a seating ring, and shall have a 24 inch diameter clear opening.

4. The frame depth shall not exceed 4 inches.

5. The frame flange shall incorporate grout holes.

6. The frame weight shall be approximately 158 pounds. The cover weight shall be approximately 136 pounds.

7. Manhole covers shall be cast with the following identification: "City of Ceres" and "Storm".

8. All manhole frames and covers shall be circular and interchangeable with other like frames and covers. If the frames and covers are not concentric and interchangeable and do not conform to the standard City frame and cover then they shall be rejected, and shall be removed and replaced by the contractor at no cost to the City.

9. For storm manhole larger than 48 inches in diameter, precast reinforced concrete manholes shall be used. Manholes shall conform to the specifications of sanitary sewer manholes.

D. Catch Basins

Storm drain catch basins shall be cast-in-place conforming to the Standard Details. Concrete shall be Portland Cement and have a 28 day compressive strength of 3,000 pounds per square inch with a 1 inch maximum aggregate size. The storm drop inlet grate cover & frame shall be all miscellaneous iron and steel hot dip galvanized after fabrication to conform to the requirements of Section 75-2 of the State Standard Specifications. Damaged galvanizing shall be mitigated in conformance with Section 66-1.02E(4) of the State Standard Specifications.

E. Headwalls, Wingwalls and Endwalls

All headwalls, wingwalls and endwalls shall be Portland Cement and have a 28 day compressive strength of 3,000 pounds per square inch and shall be constructed in accordance with the approved plans and Section 51 of the State Standard Specifications. Temporary bank protection may be provided by sack rip-rap in accordance with Section 72 of the State Standard Specifications.

3-1.03 EXECUTION

A. Storm Drain Pipe

1. Testing Prior to Construction

Tests on reinforced concrete pipe shall be required to determine conformance with "D" load and the reinforcing requirements of these specifications.

Pipe samples for testing shall be furnished, without charge, by the contractor one week in advance of construction. The cost of testing the pipe shall be borne by the contractor. One section of pipe from each lot to be used shall be tested in accordance with the procedures outlined in ASTM C76. Lots tested shall be marked with the date manufactured and by lot number for shipment to the specific project for which that lot has been tested. Any pipe arriving on the job without the appropriate markings shall be rejected and sent back to the supplier until the lot(s) can be tested and accepted for use.

In lieu of the above testing of reinforced concrete pipe, the contractor may submit to the City Engineer the manufacturer's "Certificate of Compliance" guaranteeing that the pipe meets the requirements of ASTM C76.

2. Laying Pipe

The pipe shall be laid in conformity with the prescribed lines and grades shown on the approved plans. Lines and grades shall be obtained by use of a laser. The contractor shall verify the depth and alignment of any existing storm drain line prior to construction. If the existing storm drain alignment and depth is not as shown on the approved plans then the contractor shall obtain the approval of the City Engineer before proceeding. All adjustments to line and grade shall be made by scraping away or filling in and tamping under the body of the pipe and not by blocking or wedging. Pipe shall be positioned with the bell end upstream and shall be laid upstream from structure to structure.

3. Bedding

All pipe shall be bedded. The shaped bedding shall conform to the provisions of Section 19.3 of the State Standard Specifications and the pipe manufacturer's specifications. In case of conflict the pipe manufacturer's specifications and published recommendations shall govern.

4. Pipe Penetration

Construction of storm drain manholes and pipe penetrations into storm drain manholes shall conform to methods and materials as directed in Manholes of these specifications.

5. Testing After Construction

The contractor shall inspect all new lines with Closed Circuit Television (CCTV) and furnish a tape to the City Engineer. The contractor shall give the City Engineer at least 2 working days notice prior to televising the line(s), so that a City representative can observe the work. The contractor shall clean all lines and manholes of dirt and other debris, remove pipe crowns, compact trenches, raise manhole rims to grade and correct all visible infiltration, leaks and deficiencies prior to inspection. Areas adjacent to manholes shall be leveled and made accessible to the television trailer. All inspection, equipment time and costs for the inspection is the responsibility of the contractor.

All defects and deficiencies discovered during these inspections shall be corrected by the contractor, at the contractor's expense, to the satisfaction of the City Engineer.

Depth tolerances for trapped water shall not exceed 10% of the pipe diameter, or 1 inch, whichever is less.

Broken, cracked or damaged ends of pipe shall be rejected. Minor chipped ends of ¼ inch or less shall be permitted provided cracking and excessive damage is not evident.

If the City suspects that there are damages or breaks in the line then the televised inspection shall be repeated within the one-year warranty period. All defects discovered in any inspection shall be corrected by the contractor at his expense. The contractor is responsible for the cost of these inspections.

B. Catch Basins

1. All cast-in-place concrete work shall be in conformity with Concrete Structures of these specifications.

2. All storm drain catch basins and drain inlets shall be labeled with the City's approved *Only Rain Down The Drain* placard with discharge hotline number, prior to acceptance by the City.

C. Excavation and Backfill

Excavation and backfill for pipes, manholes, trench drains, and catch basins shall be in accordance with Earthwork of these specifications.

D. Detention Basins

All grading work shall be in conformance with the approved plans and Earthwork of these specifications. All fencing, walls, access ramps, service roads, pumping facilities shall conform with the approved plans, Standard Details, and these specifications.

E. Fencing Drain

All excavation and backfill shall conform with the approved plans and Earthwork of these specifications.

3-1.04 MEASUREMENT AND PAYMENT

A. Pipe

Payment for storm drain pipe complete in place shall be per linear foot measured from center-of-manhole to center-of-manhole or catch basin, or from center of manhole to wall of outlet structure. Measurement shall be along a line parallel to the grade of the storm drain.

Payment shall include the furnishing of all labor, excavation, bedding, backfill, materials, water, tools and equipment required to construct and complete, in an efficient and workmanlike manner, the installation of storm drain pipe, television inspection, and cleaning in accordance with the approved plans and these specifications.

Full compensation for all incidentals arising from this work shall be included in the price paid per linear foot measure and no further compensation shall be allowed.

B. Structures, Manholes, Catch Basins and Rockwells

The unit of measure for payment shall be per each unit. Payment shall be made at the bid price per item for each structure complete in place and shall include the cost of excavation, backfill, frames, covers, plates or reinforcing steel.

Full compensation for all incidentals arising from this work shall be included in the price paid per each unit and no further compensation shall be allowed.

C. Basins

Excavation for basins shall be measured for payment by cubic yard. Access ramps and service roads shall be measured per square feet of material laid (e.g., asphalt concrete, aggregate base, geotextile fabric, etc.) Fencing shall be measured by linear foot and walls shall be measured by square foot.

Payment shall include the furnishing of all labor, materials, water, tools and equipment required to construct and complete the basin in accordance with the approved plans and these specifications.

D. Trench Drains

Trench drains shall be measured by the linear foot. Payment shall be made by the contract bid price and shall include the furnishing of all labor, materials, tool, excavation, backfill,

detention, and equipment required to construct and complete the work in accordance with the approved plans, Standard Details, and these specifications.

CHAPTER - 4

SANITARY SEWER

4-1.01 GENERAL

Work shall include the furnishing of all the labor, excavation, bedding, backfill, materials, tools and equipment to construct and complete the installation of the sanitary sewer mains, laterals, manholes, testing, television inspection, and cleaning in accordance with the approved plans, Standard Details and these specifications.

4-1.02 MATERIALS

A. The City Engineer shall approve the source and supply of materials as per Section 1.5 of these specifications.

B. Gravity Sewer Pipe

1. Vitrified clay pipe (VCP) shall be extra strength, bell and spigot, compression joint pipe, conforming to 207-8, Pipe Joint Types and Materials of the Standard Specifications for Public Works Construction (SSPWC) as amended and as it applies to vitrified clay pipe.

2. Ductile Iron Pipe (DIP) shall be Pressure Class 350 and shall conform to ANSI/AWWA C151. All DIP shall be protected by a polyethylene encasement meeting the requirements of ANSI/AWWA C105. Fittings shall conform to ANSI/AWWA C110. Ductile iron pipe for use in gravity sewer systems shall be lined with Protecto 401 Ceramic Epoxy Liner or an equal.

3. VCP joints shall be Type G (as in gulf) and shall comply to SSPWC 208-2.3, Type G Joints (Polyurethane). Joints between dissimilar materials shall be Type Z (as in zulu) and shall comply to SSPWC 208-5, Type Z Joint.

C. Bedding

All pipes shall be bedded. The bedding shall be shaped and shall conform to 19-5, Compaction of the State Standard Specifications and the pipe manufacturers recommendations and specifications. In case of conflict the pipe manufacturer's specifications shall govern.

D. Service Laterals

1. Pipe shall be of the same type and class as that used for the main.

2. Joints and couplings for laterals shall be of the same type and specifications as those used for the main.

E. Connections

1. Vitrified Clay Pipe (VCP)

a. For 6 inch VCP mains, a cut-in clay wye or tee shall be used with plain ends along the "run" (longitudinal axis) of the pipe; a bell branch end may be used.

b. Cut-in wye connections are only allowed in mains less than 12 inches in diameter.

c. When cutting in a wye or tee, well graded, crushed stone or crushed gravel, meeting the requirements of ASTM C 33, Gradation 67 (3/4 to No. 4) shall be placed within the right of way to provide full support for the main line and the service lateral.

d. When connecting the existing main to the wye or tee, a band seal with stainless steel shear type sewer repair couplings, or an equal shall be used.

e. When connecting a VCP sewer lateral from the manhole to the right of way, DIP shall be inserted into the manhole and extended a minimum of 2 feet from the outside of the manhole. The DIP shall be connected to the VCP service lateral with stainless steel and neoprene couplings with shear bands.

f. All connections at new and existing manholes shall be made with matching crowns (exterior apex of a pipe).

F. Manholes

1. Pipes larger the 72 inches in diameter shall have manholes constructed of custom boxes with 48 inch diameter sections with a cone and grade rings extending to the surface. Manhole spacing shall not exceed 350 feet.

2. Standard Precast

Provide a precast reinforced concrete sanitary sewer section manholes, base sections & related components for trunk line less than 15 inches conforming to ASTM C 478, except that Portland cement shall be Type II modified cement. The manhole base, riser and cone shall have a minimum 28 day compressive strength of 4,000 pounds per square inch. Manholes shall be constructed in accordance with the Standard Details. Manhole bases shall be cast-in-place concrete.

3. Lined Manholes

Manholes on trunk sewer lines shall be lined with SuperCoat or polyurethane. The lining shall be applied to all unlined interior concrete surfaces of the manhole.

Polyurethane lining shall consist of an epoxy base overlain with a polyurethane finish.

The epoxy base shall be applied to a thickness of 5 mils. The polyurethane shall be applied to a thickness of 125 mils in one continuous coat and without seams and free from holes or defects. SuperCoat lining (Lafarge Aluminates.) or an equal shall be used. The lining shall be applied by a licensed applicator and in accordance with the product manufacturer's recommendations and specifications. The depth of the application shall be ¾ inch (minimum) to 1 inch (maximum).

The lining shall be warranted by the contractor for five 5 years against any type of failure. The Contractor shall remove and replace all failures at his expense and as soon as practicable following written notification from the City Engineer of the distress or failure.

4. Acid Resistance Polymer Manholes

a. Provide acid resistant polymer manhole sections, base sections and related components for trunk lines 15 inches & larger conforming to ASTM C 478. ASTM C 478 material and manufacturing is allowed compositional and dimensional differences required by a polymer product.

b. Provide base riser section with integral floors, unless shown otherwise.

c. Provide riser sections joined with bell and spigot / ship-lap design seamed with butyl mastic (ASTM C 990) so that on assembly, manhole base, riser and top section make a continuous and uniform manhole.

d. Construct riser sections for polymer manholes from standard polymer manhole sections of the diameter indicated on drawings.

e. Use various lengths of manhole sections in combination to provide correct height with the fewest joints.

f. Design wall sections for depth and loading conditions with wall thickness as required by polymer manufacturer.

g. Provide tops to support HL-93 vehicle loading and receiving cast iron frame covers, as indicated on drawings.

h. Where polymer transition slabs are required provide precast base sections with flat polymer slab top sections used to transition to 48-inch diameter manhole access riser sections. Transition can be concentric or eccentric as shown on drawings. Locate

transition to provide minimum of 7-foot head clearance from base to underside of transition unless otherwise approved by engineer.

5. Manhole frames and covers shall be South Bay Foundry 24 inch diameter.

   a. The cover & frame shall be cast ductile iron or an approved equal.

   b. Frames shall be circular, shall include a seating ring, and shall have a 24 inch diameter clear opening.

   c. The frame depth shall not exceed 4 inches.

   d. The frame flange shall incorporate grout holes.

   e. The frame weight shall be approximately 158 pounds. The cover weight shall be approximately 136 pounds.

   f. The manhole cover shall seat evenly and firmly in the frame. Manhole covers shall be cast with the following identifiers: "City of Ceres" and "Sanitary Sewer".

G. Cleanouts

Cleanout structure, frames and covers shall be equal to sanitary sewer manhole requirements.

H. Carrier or Casing Pipe

Pipe used as a conductor pipe below a highway or railroad shall be welded steel pipe. The pipe shall conform to the 207-10, Steel Pipe of the SSPWC. The protective lining and coating shall be as shown on the approved plans and shall conform to 207-10.4.1, Protective Lining and Coating for Steel Pipe of the SSPWC. If the conductor pipe is installed by boring and jacking then the wall thickness shall be ¼ inch for sizes less than and equal to 24 inches in diameter, and 5/16 inch for sizes greater than 24 inches in diameter and less than or equal to 36 inches in diameter.

4-1.03 EXECUTION

A. Sanitary Sewer Installation

All sanitary sewer pipe installations shall be completed as specified herein except where modified by Section 4-1.2 of these specifications. All pipes shall be laid to conform to the prescribed line and grade as shown on the approved plans and each pipe length shall be checked to the grade line.

If the diameter of the pipe changes, or if there is a change in alignment at a manhole that is equal to or greater than 20º, then the flow line of the upstream pipe shall be a minimum of 0.1 feet above the

flow line of the downstream pipe, or an amount necessary to match pipe crowns, whichever is greater. The approved plans shall show invert elevations at manholes.

The use of laser grade setting systems is preferred. The contractor is responsible for providing an instrument operator who is qualified and trained in the operation of the laser. The operator must adhere to the provisions of the State of California Construction Safety Orders issued by the Division of Industrial Safety.

All laser control points shall be established benchmarks or construction offset stakes identified on cut sheets and set in the field for the work.

Each length of pipe shall be laid on compacted, approved shaped bedding and shall have full bearing for its entire length. Bell holes shall be excavated in the bedding to allow for unobstructed assembly of all bell and spigot joints. The pipes shall be installed to the witness lines. If the witness line is concealed at any joint then the contractor shall remove and reinstall the pipe as required to expose the witness line at the contractor's sole expense. Stabbing, swinging in or popping on spigot ends of pipe into bell ends will not be permitted. All gaps and voids between the pipe and the bell holes shall be packed with bedding.

Adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping approved material under the body of the pipe. Wedging and blocking to adjust the pipe will not be permitted.

A sewer line, unless otherwise approved by the City Engineer, shall be laid, without break, upstream from the point of connection to the existing sewer and with the bell end forward or upstream. The pipe shall not be laid when the City Engineer determines that the condition of the trench or the weather is unsuitable. When pipe laying is not in progress the upstream forward end of the installed pipe shall be sealed with a temporary plug or cap.

Sewer pipes, branches, stubs, or other open ends which are not immediately connected shall be plugged or capped with a standard watertight plug or cap. The plug or cap shall be placed on a standard end.

Pipe entering or leaving manholes or other structures shall have joints within 30 inches of the manhole base. In all cases, flexibility of joints at the manhole base shall be preserved to prevent damage to the pipe by differential settlement. All sewer line connections to manholes, trunk sewers, main sewers, or side sewers shall be left uncovered until after City observation has been completed. After City observation of the connection, the trench shall be backfilled as specified on the approved plans.

If the sewer is to be laid in an area that is to be filled, and the cover prior to filling is less than 5 feet then the pipe shall not be laid until the area has been filled to a level 5 feet above the proposed pipe and compacted to a minimum 90% relative compaction.

B. Service Laterals

The contractor's attention is directed to the Standard Details for additional requirements pertinent to lateral installations.

Wyes or Tees: wyes for VCP and tees for DIP

1. Excavate sewer main to a point 6 inches below the required depth.

2. Make three initial cuts in the main 2 inches to 6 inches apart and remove the rings. Cut the main to the required length to insert the wye or tee.

3. Within the right of way place 6 inches of well-graded, crushed rock, meeting the requirements of ASTM C33, Gradation 67 (3/4 to No. 4) under the main line and the sewer service lateral.

4. Install the wye or tee per City of Ceres Standard Details. A tee shall be used for mains that are deeper than 10 feet below the adjacent finish grade.

That portion of any lateral line to be placed under an existing curb and gutter and/or sidewalk may be done by boring or cutting and replacing and matching the existing curb and gutter and/or sidewalk.

The lateral line shall have a clean-out at the back edge of sidewalk as shown on the Standard Details. Laterals and cleanouts shall not be located in driveways, ramps and aprons.

Where required, an approved backwater valve shall be installed ahead of the cleanout and behind the sidewalk. An appropriately sized valve box with adequate clearance to access and maintain the device, along with the correct number of grade rings, (to bring the lid to finish grade), shall be installed. The wye branches, unless otherwise specified, may be inclined at any angle less than 45º degrees from the horizontal.

The end of the lateral service shall extend a minimum of 24 inches and a maximum of 48 inches beyond the rear edge of the sidewalk in streets having sidewalks adjacent to the curb and shall extend a minimum of 6 inches and a maximum of 12 inches beyond the back edge of the curb for sidewalks that are separated from the curb by a planter strip and in commercial sidewalks.

The location of every sewer service shall be marked with an "S" directly above the service and shall be stamped into the face of the curb. The "S" shall be 2 inches in height and ¼ inch in depth.

C. Manholes

1. Precast Manhole Construction - Excavation and backfill for all precast manholes shall be in conformance with the requirements of Section 19-3, Structural Excavation and Backfill of the State Standard Specification. All embedment materials under, around and at least 3 inches over all pipelines located within five feet of structure bases shall be compacted

(without jetting) prior to section placements. All precast manholes shall be constructed to subgrade prior to adjoining sewer pipeline trench and/or structure backfill. Pre-cast manhole bases shall not be used.

Manholes installed in areas outside of the street shall have bolted manhole covers. Rim elevations shall be a minimum of 12 inches above the adjacent finish grade. The exposed manhole above finish grade shall be constructed of grade rings. If the manhole outside an existing street is in a future street area then grade rings shall extend below the existing ground surface for at least 18 inches. Four bollards shall be installed around the manholes in a rectangular pattern and centered on the manhole to protect the manhole.

All joint surfaces of precast sections and the face of the manhole base shall be cleaned prior to setting precast sections. These various sections shall be set in preformed plastic sealing gaskets of material conforming to the requirements of Federal Specification SS-S-00210.

a. Installation of gaskets - Apply one coat of primer to a clean, dry joint surface (both tongue and groove) and of the two-piece wrapper on the gasket. Before setting the manhole section in the trench, attach the plastic gasket strips end-to-end to the tongue or groove of each joint, forming a continuous gasket around the entire circumference of the manhole joint.

b. Handling of barrel sections after the plastic gasket has been affixed shall be carefully controlled to avoid displacing the gasket contaminating it. If gaskets are damaged then they shall be removed and replaced. If gaskets are displaced then they shall be repositioned.

c. Care shall be taken to align the manhole section with the previously set section before it is lowered into position.

d. During cold or wet weather, heat the concrete joint surface lightly until ice, frost and moisture are removed and the surface to be primed is dry before application of the primer. The primer and the plastic gasket strips shall only be applied within the temperature range specified by the product manufacturer.

e. The cast-in-place base shall be Portland cement, 28 day, 4,000 pounds per square inch concrete with a 1-½ inch maximum size aggregate. The base shall bear on firm, undisturbed soil, and shall be dimensioned as shown on the Standard Details. Where sewer lines pass through manholes, the pipe shall be laid continuously as a whole pipe. Provide joints within 30 inches of manholes as per Section 4-1.3 of these specifications. After the manhole base and precast sections have been placed and all concrete and grout is set, the top half of pipe within the manhole shall be removed and the sides mortared. All channels formed shall be checked with a template and the surfaces shall be smooth.

f. Temporary covers of steel plate of sufficient size to adequately cover the channel shall be installed. Ribs shall be welded to the underside of the cover to hold it in place during grading operations.

g. The throat of the manhole shall be made of precast concrete rings. The minimum depth of throat permitted shall be one 3 inch ring between the cone and the frame. The maximum throat height permitted shall be 12 inches of rings between the cone and frame.

h. When adjusting the manhole frame and cover to grade, the frame may be wired to a beam of sufficient strength and length to span the excavation and the throat completed to the specified level. Whenever the space between the bottom of the frame and the top of a ring is less than 3 inches, the void may be filled with concrete, poured against a suitable form on the inside of the structure.

i. When adjusting an existing manhole to grade and the total depth of the throat from the top of the frame to the bottom of the throat exceeds 18 inches, the upper portion of the manhole shall be removed to the first full-size manhole section. The upper portion shall then be reconstructed as outlined above.

j. Penetrations for connections to existing manholes shall be core drilled by the contractor. Single cores shall be cored between ½ inch to ¾ inch larger than the pipe outside diameter and shall not exceed 20 inches in diameter. Cores larger than 20 inches in diameter shall be performed by the contractor drilling multiple small diameter cores no larger than 1 inch diameter, spaced no greater than ¾ inch between outside diameter of cores, through the concrete manhole wall, in a symmetrical pattern, not to exceed ¾ inch of the diameter of the newly installed pipe. The cored area to be removed shall not be removed by the use of impact hammers.

k. Use of a pneumatically powered chipping hammer for the removal of the pre-drilled core shall be on a case-by-case basis and when approved by the City Engineer. The surface edge of the cored opening shall be ground or milled to the limits specified, with all reinforcing wire ground to the level of the surrounding concrete wall of the core opening. Reinforcing wire shall be removed and shall not be permitted to remain in the core cut.

l. The newly installed pipe shall be inserted into the cored opening 4 inches beyond the inside wall of the manhole, measured at the spring-line of the pipe. The contractor must contour the inserted end of the pipe, by grinding or other acceptable means of conforming to the contour of the manhole, to provide access to the interior of the manhole as required. If fittings are planned for the inserted end of the pipe then contouring may not be required.

m. Sealing the pipe shall be performed by the contractor inserting the pipe through the cored hole in the manhole wall to the penetration depth required, contouring the end of the pipe (if required) and packing the annular space between the pipe and the edge of the cored opening (inside and outside of the manhole wall) with a stiff mix of concrete mortar thoroughly compacted or preferably premixed high strength non-shrink concrete grout. The mortar shall be composed of one part of Type 2 Portland cement and three parts of clean sand. Brick, stone or other material shall not be used as filler or blocking. The interior mortared area shall have a smooth finish similar to the adjacent barrel section of the manhole wall which follows the contour of that interior wall. The exterior mortared area should fully cover the entire cut area and shall conform to the same contour as the exterior wall of the manhole

barrel. This exterior mortared area shall exceed the dimensions of the cored area and may extend to, but not extend beyond the first pipe joint. The exterior grout seal shall not be aggregate based concrete. Connections shall be watertight.

n. Before any work is started on adjusting or repairing a manhole, the channels in the base shall be covered with strips of wood, and the entire base covered with a heavy piece of canvas. This cover shall be kept in place during all work. Upon completion of the work the wood strips and the canvas shall be removed from the manhole; debris shall be removed from the manhole.

2. Lined Manholes

Installation of SuperCoat or polyurethane lining shall conform to the manufacturer's specifications.

a. Field Joints

All joints between lined concrete pipe and lined structures shall be either Type C-1 or Type C-2 as defined in Section 311-1.5.3, Field Joints in Cast-in-Place Structures of the SSPWC.

Field joints between sections of lined pipe shall be Type P-1 as defined in Section 311-1.5.2, Field Joints in Pipe Installation of the SSPWC. When transitioning between lined and unlined pipe, a factory "turn back" shall be used or a Type 316 stainless steel band and neoprene gasket/termination secured with Type 316 stainless steel wedge anchors provided at the transition for the full pipe circumference. The contractor shall provide transition details to the City Engineer for review and approval prior to installation. Field joints in lined structures shall be one of the following types as defined in the SSPWC: Type C-1, Type C-2 or Type C-3.

b. Field Welding and Testing

Field welding and testing of the lining of structures and between pipe and structures shall be made in conformance with the lining manufacturer's specifications and recommendations. The surface of the liner shall be cleaned to permit visual inspection and spark testing using a 20,000 Volt Tinker and Rasor Spark Tester, Model No. AP-W with power pack; or an equal. All tests shall be performed by the contractor in the presence of the City inspector. The inspector shall be notified at least 2 working days in advance of a scheduled test.

c. Polyurethane Lining

The Contractor shall furnish all labor, material and equipment necessary for the preparation of surfaces, application of lining, safety procedures, protection of existing surfaces, equipment and cleanup.

All new concrete surfaces shall be grit blasted to provide proper adhesion of coating.

All debris produced from the blasting operation shall be removed from the manhole prior to coating. No debris shall be allowed to enter the sewer system. The concrete surfaces shall be air dried prior to installation of the liner.

All unnecessary holes in the manhole shall be sealed prior to lining with acid resistant sealant recommended for surfaces being sealed.

The installation of the lining shall be performed by workers trained and experienced with the specified material. The lining shall be applied by high pressure airless equipment approved by the lining manufacturer. The equipment shall be in good working order to ensure correct proportioning and mixing of the components.

The polyurethane shall be applied to a thickness of 125 mils in one continuous coat, without seams, free from holes and defects. The lining shall be installed over dry concrete.

During the lining application the contractor shall take wet gage thickness readings as required to ensure correct lining thickness.

The finished coating shall be free from porosity, without bubbles or pinholes and uniform in color. All areas in question shall be removed and reworked to the satisfaction of the City Engineer.

Application of the lining shall not take place when exposed to rain, fog or high winds.

The lining shall be warranted by the contractor for five years against any type of failure. The contractor shall remove and replace all failures at his expense and as soon as practicable following written notification from the City Engineer of the failure.

3. Acid Resistance Polymer Manhole

a) Manhole risers, conical tops, slab tops and grade rings shall be designed, by manufacturer, to meet the intent of ASTM C 478 with allowable compositional and sizing differences required by a polymer product and modification to accept polymer construction in lieu of concrete as follows:

b) AASHTO LRFD HL-93 design live loading applied to manhole cover and riser sections.

c) Polymer manholes will be designed based upon live and dead load criteria in ASTM C 857

d) Polymer Mixture - the mixture shall consist solely of thermosetting resin, sand and aggregate. Resin used shall be unsaturated, certified, isophthalic polyester resins or vinyl ester resins. Mixing lots of resin from different manufacturers is not allowed. No cementitious or calcium carbonate materials shall be allowed.

e) Thermosetting Resin - The resin shall have a minimum of deflection temperature of 158° F when tested at 264 psi (1.820 mPa) following Test Method D 648. The resin content shall not be less than 7% of the weight of the sample as determined by test method D 2584. Resin selection shall be suitable for applications in the corrosive conditions to which the structures will be exposed.

f) Required wall thickness for all members will be a minimum of 2". The wall thickness of risers and conical tops shall be not less than that prescribed by the manufacturer's design by more than 5%. A wall greater than the prescribed design shall not be cause for rejection.

g) Manhole joints shall be of a flush flat edge design that on assembly with alignment guides and gasket will make a continuous and uniform manhole. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.

h) Each manhole component shall be free of all defects, including indentations, cracks, foreign inclusions and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. Variations in height of two opposite sides of risers and conical tops shall not be more the 5/8 inch. The under run in height of a riser or conical top shall not be more than 1/4in. /ft. of height with a maximum of ½ inch in any one section.

i) Marketing and Identification - Each manhole shall be marked on outside with the following information - Manufacturer's name or trademark, Manufacturer's location and Production Date.

j) Invert channels are to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Invert slope through manhole is as indicated on drawings. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts. Unexposed support areas for enclosed invert and bench areas may be constructed of fill material and coated with a covering that will interlink with wall resins to prevent fill material corrosion.

k) Exceptions to ASTM C 478- components shall be designed for the intended combinations of manufacturing materials. Component designs may be as non-reinforced members or reinforced members as recommended by the manufacturer. Steel reinforcement is not required for circumferential reinforcement, joint reinforcement, or hoop reinforcement, but may be placed for the purpose of product handling.

d. Trench Excavation and Backfill

All excavation and backfill for pipes and manhole structures shall be in conformance with these specifications.

e. Testing of Sewer Lines

All leakage tests shall be completed and approved after backfilling and prior to resurfacing.

f. Cleaning and Flushing

Prior to performing a leakage test, the pipe installation shall be thoroughly cleaned. Cleaning shall be performed by the Contractor by means of an inflatable rubber ball. The ball shall be of a size that will fit snugly into the pipe to be flushed. The ball shall be placed in the last cleanout manhole on the pipe to be cleaned, and water introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. If any wedged debris or damaged pipe stops the ball then the contractor shall remove the obstruction. When a new sewer is connected to an existing line, cleaning and flushing shall be carried out to the first existing manhole downstream from the point of connection.

g. Low-Pressure Air Test

After completing backfill of a section of sewer line, the Contractor shall at his/her expense, conduct a Line Acceptance Test using low-pressure air per Table 4.1. The test shall be performed using the equipment listed below, according to stated procedures and under the supervision of the City Engineer.

Procedure – Low Pressure Air Testing

The section of pipe to be tested shall be isolated by completely blocking all outlets in the section under test. Careful attention must be given to the bracing of all plugs, as the line will be under pressure. A plug at the manhole must be equipped with an air inlet to fill the line from the air compressor. The air compressor which feeds air into the pipe must be equipped to control the air entry rate and to prevent the pressure from exceeding 5 pounds per square inch gauge pressure (psig). The air compressor shall be fitted with a blow-off valve to operate at a maximum pressure of 5 psig.

After the pipe has been wetted, the air shall be allowed to slowly fill the pipeline until a constant pressure of 4 psig is maintained. The air compressor shall be controlled so that the internal pressure in the line is maintained between 3-1/2 psig and 4 psig for at least two minutes to permit the temperature of the entering air to equalize with the temperature of the pipe wall. If air must be bled then a new two minute interval must be allowed when the line has been refilled.

When the temperature of the air has reached equilibrium with that of the pipe wall, the air source shall be disconnected. Before disconnecting the air supply, the pressure shall be at 4 psig. When the pressure has dropped to 3-1/2 psig, a stopwatch will be started and stopped when the pressure has reached 2-1/2 psig. The time required, as shown on the watch, for the loss of 1 psig drop shall be in accordance with ASTM C 828 or NCPI Low Pressure Air Tables for Sanitary Sewer. The portion of

line being tested shall be considered "Acceptable" if the time required in minutes for the pressure to decrease from 3-1/2 psig to 2-1/2 psig is not less than the time presented in Table 4.1.

Table 4.1 Low Pressure Air Test for Sewers

Main line diameter in inches	Main line length in feet	Time (minutes : seconds)			
		4 inch diameter lateral length (main to house)			
		100 feet	200 feet	300 feet	400 feet
6	50	0:37	0:57	1:15	1:33
	100	1:00	1:18	1:36	1:57
	150	1:21	1:39	1:57	2:15
	200	1:42	2:00	2:18	2:36
	300	2:24	2:42	3:00	3:18
	400	3:06	3:24	3:42	4:00
8	50	0:54	1:12	1:30	1:48
	100	1:30	1:48	2:06	2:24
	150	2:06	2:24	2:42	3:00
	200	2:42	3:00	3:18	3:36
	300	3:54	4:12	4:30	4:48
	400	5:06	5:24	5:42	6:00
10	50	1:03	1:21	1:39	1:57
	100	1:48	2:06	2:24	2:42
	200	3:18	3:36	3:54	4:12
	300	4:48	5:06	5:24	5:42
	400	6:18	6:36	6:54	7:12
12	50	1:12	1:30	1:48	2:06
	100	2:06	2:24	2:42	3:00
	200	3:54	4:12	4:30	4:48
	300	5:42	6:00	6:18	6:36
	400	7:30	7:48	8:06	8:24
15	50	1:21	1:39	1:57	2:15
	100	2:24	2:42	3:00	3:18
	200	4:30	4:48	5:06	5:24
	300	6:36	6:54	7:12	7:30
	400	8:42	9:00	9:18	9:36

The air test shall be performed after backfill and compaction and prior to final paving and placement of curbs, gutters and sidewalks. The contractor shall furnish all equipment needed to complete this test. If the installation fails to meet this requirement then the contractor shall, at his own expense, determine the source of the leakage. The contractor shall repair or replace all defective materials and/or workmanship and perform the air test as many times as is necessary to complete an acceptable test.

h. Televised Inspection

The contractor shall inspect all new pipes with closed circuit television and furnish a CD/DVD of the inspection, along with a hard copy report to the City. The contractor shall give the City Engineer at least two working days notice prior to performing the TV work so a City representative can observe the work. The contractor shall: clean all lines of dirt and debris, clean manholes, remove broken pipe, compact trenches, raise manhole rims to grade, and pass air tests prior to television inspection. Areas adjacent to manholes shall be leveled and made accessible to the television trailer.

Defects such as high and low spots, joint separations, offset joints, chipped ends, cracked or damaged pipe, infiltration points and debris in lines shall be corrected by the contractor at his expense. See Table 4.2 – Depth Tolerance of Trapped Water in Sewer Pipes. For joint separations, low spots and chipped ends the following maximum acceptable limits will apply for 8 inch and 10 inch pipes: Joint separations - ½ inch; Chipped ends – ¼ inch.

Table 4.2 Depth Tolerance of Trapped Water in Sewer Pipes

Pipe diameter	Depth tolerance of trapped water
6 inches	½ inch
8 inches	¾ inch
10 inches	1 inch
12 inches and greater	1 inch

i. Cleanouts

Cleanouts shall be constructed inside the City right of way.

4-1.04 MEASUREMENT AND PAYMENT

A. Pipe

Payment for sanitary sewer pipe complete in place shall be per linear foot measured from center of manhole to center of manhole following a line parallel to the grade of the sewer. Payment shall include the furnishing of all labor, excavation, bedding, backfill, materials, water, tools, and

equipment required to construct and complete the installation of the sewer pipe testing, television inspecting, and cleaning in accordance with the approved plans and these specifications.

B. Structures and Manholes

The unit of measure for payment shall be per each unit. Payment shall be made at the bid price per item for each structure complete in place and shall include the cost of excavation, bedding, backfill, frames, covers, plates, reinforcing steel, and cleaning in accordance with the approved plans and these specifications.

CHAPTER - 5

WATER SYSTEM

5-1.01 GENERAL

All improvements, including extensions, replacements and repairs, shall conform to the requirements of California Title 22 water works, the American Water Works Association, the Ceres Municipal Code, the approved project plans and the Standard Specifications and Standard Details of the City of Ceres. In all cases, water mains shall be of sufficient size to meet fire-flow requirements specified in the Ceres Fire Code. Coordinate any and all activities relating to the City's water system with the Engineering department at 538-5792. All projects shall be approved and inspected by the Engineering department before work is to begin. Only city staff, or as directed by city staff, can operate any water valves associated with the City's water system, coordinate all activities with the city inspector.

5-1.02 MATERIALS

A. The City Engineer shall approve of the source and supply of materials as per Section 1-5 of the State Standard Specifications.

B. Pipes

The contractor shall furnish all labor, material, equipment and appliances required to complete the water mains and services specified.

1. Ductile Iron Pipe (DIP)

   a. Ductile iron pipe Class 350 Pressure may be substituted for Polyvinyl Chloride Pipe (PVC) up to, and including 12 inch diameter pipes. DIP shall conform to the AWWA C111 for rubber gasket joints, and shall meet AWWA standard C600 for installation. Material for water pipe with diameters greater than 12 inches shall be specified by the City Engineer.

   b. Ductile iron pipe shall have "Tyton Joints", "Ty-Seal Joints", or an approved equal and shall be cement lined in conformance with AWWA C-104. All ductile iron pipe shall be protected by a polyethylene encasement in conformance with AWWA C-105.

2. Polyvinyl Chloride Pipe (PVC)

a. Polyvinyl chloride pressure pipe shall be Class 150 DR 18, shall conform to AWWA C-900-16 and AWWA C-603 for installation. All polyvinyl chloride pipe shall have 20 feet laying lengths. The color of the pipe shall be blue.

b. Joints of PVC pipe shall have elastomeric-gasket bell ends or couplings. The bell ends shall be integral thickened bell end or integral sleeve-reinforced bell end. The bell end joints shall have a minimum wall thickness of the bells or sleeve-reinforced bells, equal at all points to the Standard Dimension Ratio (SDR) requirements for the pipe. The minimum wall thickness in the ring groove and bell-entry sections shall be equal to or exceed the minimum wall thickness of the pipe barrel.

   The SDR is defined as the average outside diameter divided by a minimum wall thickness.

c. Butterfly valves may not be installed below grade unless authorized by the City Engineer.

C. Bedding

All pipes shall be bedded. The bedding shall be shaped and shall conform to 19-5, Compaction of the State Standard Specifications and the pipe manufacturer's recommendations and specifications. In case of conflict the pipe manufacturer's specifications shall govern.

D. Fittings and Thrust Blocking

Bends, tees and other fittings shall be ductile iron, Class 150, for use with ductile iron pipe (Flange Fittings - AWWA 110, Mechanical Fittings - AWWA 111). All fittings for PVC pipe shall be mechanical joints except fittings with valves shall be flanged. Fittings shall be handled and jointed as specified by the pipe manufacturer. Reaction or thrust blocking shall be constructed at bends, tees, dead ends and where changes in pipe diameter occur. Blocking shall be made of Portland cement concrete with a 28-day strength of 3,000 pounds per square inch. The blocking shall be designed by a California-registered civil or mechanical engineering and the blocking details and calculations shall be submitted to the City Engineer for review and approval prior to placement of the pipe. The blocking shall be placed between undisturbed ground and the fitting to be anchored. The area of bearing of the pipe the ground shall be complete and along the full length of the pipe. The blocking shall be placed so that the pipe joints and fittings are accessible.

E. Valves and Valve Boxes

All valves shall be as follows or an approved equal:

Mueller resilient seat gate valve

American Darling compression resilient seat valve
M & H 3067 AWWA resilient seat gate valve
Kennedy resilient seat gate valve
AVK resilient seat gate valve
Clow resilient seat gate valve

Valves shall be rubber-seated, tight-closing type conforming to AWWA C-509. Valves shall open counter clockwise and shall be equipped with a 2 inch operating nut. Valve boxes shall be Christy G5 with Christy Cast Iron cover or an approved equal. The following materials may be used for extensions: 8 inch PVC pipe. All valve boxes shall be installed to finished grade. Trace wire shall be situated alongside the exterior surface of valve boxes and shall terminate in a secured hook at the top of the box.

F. Service Materials and Meter Materials

1. 1 inch thru 2 inch water services;
All plastic pipe shall be ultra-high molecular weight polyethylene flexible pipe to comply with AWWA C-901.

2. 3 inch water service;
PVC pipe, Schedule 40 or Schedule 80, shall be used for all water services greater than 2 inches and less than 4 inches.

3. 4 inch water service and larger;
PVC C-900 shall be used for all water services greater than 4 inches.

4. Meter boxes shall be provided as shown in the Table 5.1 below. All non-traffic meter boxes shall be equipped with a Fiberlyte lid. For vehicular traffic areas, a Christy lid shall be provided as follows:

Residential:	Cast-iron traffic lid
Commercial or Industrial:	Steel checker plate lid

5 For all other water service materials, acceptable brands are Jones, Ford, Mueller, McDonald and Cambridge Brass.

TABLE 5.1 Pipe Diameter and Meter Box Size

Pipe Diameter	Meter Box
1 inch	FL30
Greater than 1 inch	FL36

6. All curb valves and meters shall be placed within the City right of way and within a public utility easement. City valves and meters shall not be located on private property.

G. Water Meters

i. 1”

- Badger Model 55 Bronze Disc Meter, Bronze Bottom, Register to read in gallons. Register HR-E 8-dial encoder register, US Gallons.

ii. 1 ½”

- Domestic use shall be Badger Model 120 Bronze Disc Meter with test plug. Irrigation use shall be Badger T160 Turbo meter with strainer and test plug. Type of meter used shall be approved as part of the plan review. Register HR-E 8-dial encoder register, US Gallons.

iii. 2”

- Domestic Use shall be Badger Model 170 Bronze Disc Meter with test plug, or Badger Compound Series Meter Bronze, with strainer and test plug. Irrigation meter shall be Badger T200 Turbo meter with strainer and test plug. Type of meter used shall be approved as part of the plan review. Register HR-E 8-dial encoder register, US Gallons.

iv. 3”

- Domestic Use shall be Badger Compound Series Meter, Bronze with strainer and test plug. Irrigation use shall be Badger T450 Turbo Meter with strainer and test plug. Type of meter shall be approved as part of the plan review. Register HR-E 8-dial encoder register, US Gallons.

v. 4”

- Domestic use shall be Badger Compound Series Meter, Bronze with strainer and test plug. Irrigation use shall be Badger T1000 Turbo Meter with strainer and test plug. Type of meter shall be approved as part of the plan review. Register HR-E 8-dial encoder register, US Gallons.

vi. 6”

- Domestic use shall be Badger Compound Series Meter, Bronze with strainer and test plug. Irrigation use shall be Badger T2000 Turbo Meter with strainer and test plug. Type of meter shall be approved as part of the plan review. Register HR-E 8-dial encoder register, US Gallons.

vii. 8”

- Domestic use shall be Badger Combo Series Compound Meter, Bronze with strainer and test plug. Irrigation use shall be Badger T3500 Turbo Meter with strainer and test plug. Type of meter shall be approved as part of the plan review. Register HR-E 8-dial encoder register, US Gallons.

viii. 10”

- Domestic and Irrigation shall use Turbo T5500 Bronze Series Meter with a test plug. Fire services shall use a Fire Series Meter Assembly with a 2” M170 disc bypass including a strainer. Register HR-E 8-dial encoder register, US Gallons.

Notes:

- All Meters are to be equipped with registers and wired touch couplers able to communicate to a Sensus Flexnet System through a 520M End Point.
- All compound meters shall have the same requirements and shall be provided with 2 - 520M End Points.
- 1" Meters shall be equipped with a reading resolution in gallons, All other meters shall have a reading resolution of 100 gallons

H. Fire Hydrants

Fire hydrants shall be Clow Model 960 or an approved equal and shall conform to AWWA C-503, for wet-barrel fire hydrants. All hydrants shall be painted "Caterpillar Yellow" with a polyurethane high duty industrial enamel. All on site fire hydrants shall be painted red to distinguish between City and Private ownership.

I. Private Fire Protection System / Hydrants

Pipe materials shall be listed for fire protection service shall comply with AWWA standards and shall be designed to withstand a minimum working pressure of 150 pounds per square inch. Service connections for private fire hydrants shall not be allowed unless approved by the City Engineer and the Director of Public Works and shall only be located within a public utility easement. All private hydrants shall be installed with a City meter and with a backflow prevention device.

5-1.03 EXECUTION

A. Handling of Pipes and Accessories

1. Proper implements, tools, equipment and facilities shall be provided and used by the contractor for the work.

2. All pipe, fittings, valves, hydrants and accessories shall be lowered into the trench in a manner that prevents damage to pipe fittings.

3. Pipe or accessories shall not be dropped nor dumped into the trench. Care shall be used so that the coating on pipes, valves and fittings will not be damaged. If damage occurs then the coating shall be repaired to the satisfaction of the City Engineer. Chain slings will not be permitted.

4. Pipe loaded on trucks or stacked shall be supported on wooden blocking.

5. Pipes shall not be skidded or rolled against other pipes.

6. All foreign matter or dirt shall be removed from the interior of pipe before lowering into the trench. Pipe shall be kept clean.

7. All pipe and accessories shall be inspected for defects. Defective, damaged or unsound pipe or accessories shall be repaired or replaced at the contractor's expense. Plastic pipe shall be scrapped if wall damage (post-manufactured distress, e.g.; gouges, divots, scrapes, etc.) exceeds 10% of surface area.

B. Water Main End Covers

1. All pipe used for water service on City water projects not situated after a water meter (including, but not limited to, water main pipe, transmission line pipe, service line pipe, lateral pipe) shall be shipped from the factory, and delivered to the job site, with factory installed end covers.

2. End covers shall be tamper-evident and can include:

   a. factory installed shrink wrap on both ends
   b. factory installed caps with a factory tamper seal
   c. factory installed pipe plugs with a factory tamper seal
   d. other methods approved by the City Engineer.

3. End covers installed after factory pressure testing is completed are preferred.

4. End cover components shall adhere sufficiently to withstand wind forces during shipment.

5. End covers shall prevent animals, debris and contaminates from entering the pipe.

6. End covers shall not be removed until the pipe is being installed.

7. During installation end covers (and plugs) shall be maintained on unfinished work when pipe is not actively being installed. End covers and plugs shall prevent pipe contamination. Plywood sheeting, buckets, etc. are not acceptable end covers.

8. The City inspector has the right to have any unprotected pipe removed and replaced. The inspector may authorize unprotected pipe to be sanitized and tested at the contractor's expense.

C. Laying Pipe

1. The contractor shall verify the depth and alignment of water lines prior to construction. If existing water lines are not as shown on the approved plans then the contractor shall notify and obtain approval from the City Engineer before proceeding.

2. When waterlines are being installed in new subdivisions, mains and the fire hydrant supply lines shall be installed prior to the installation of curb, gutter, and sidewalk. Pipe shall be installed in accordance with the manufacturer's recommendations.

Uniform bearing shall be developed under the pipe. Bell holes shall be provided at each joint and shall be no larger than necessary for joint assembly.

3. All pipe for water mains and laterals shall be laid to the lines and grades as shown on the approved plans. The contractor shall be responsible for verifying ultimate finish grade. When curved alignment is shown on the plans the maximum deflection at any joint shall not exceed the manufacturer's recommendation for the type of pipe and joint being used.

4. Pipes shall be installed to the witness lines. If the witness line is concealed at any joint then the contractor shall remove and reinstall the pipe as required to expose the witness line at the contractor's sole expense. Stabbing, swinging in or popping on spigot ends of pipe into bell ends will not be permitted. All gaps and voids between the pipe and the bell holes shall be packed with bedding.

5. Prior to connection pipe sections the mating surfaces shall be cleaned with a mild solution of chlorinated water (do not acidify the solution below a pH of 5.0).

6. Thrust blocks of Portland cement concrete with a 3,000 pounds per square inch 28 day compressive strength concrete shall be cast-in-place at all bends, reducers, behind each tee, at each cross tee, and at the back of fire hydrants. The thrust block shall extend from the fitting to undisturbed soil, shall be kept clear of the joints, and shall be full bearing.

7. If pipe laying is discontinued, or when work is stopped at the end of the day, then the open ends of all mains shall be closed with watertight plugs or bulkheads. The plug or bulkhead shall not be removed unless, or until, the trench is dry.

8. Valves shall be set plumb and properly fitted to the adjacent sections of the main. A valve box shall be installed over each valve. Valves shall be supported with a reinforced portland cement concrete slab that is a minimum of 3 inches deep and 12 inches wide. The slab shall be centered below the valve. Valves shall not be set in concrete.

9. Tracer (locating) wire shall be laid on top of PVC pipe and connected at valves. Tracer tape shall also be installed.

D. Installation of the services

Installation of the services shall consist of the following basic steps:

1. Excavation of the service trench.

2. Clean the water main.

3. Place and tap.

4. Open tap valve immediately after making tap to flush material from the main line.

5. Insert stainless steel sleeves in the plastic pipe and tighten service line connections as per the manufacturer's recommendations.

6. Place the service line at right angles to the water main.

7. Use boring or pushing methods, but not washing methods, to place pipe under curb and sidewalk.

8. Backfill and compact the dirt above the spring line.

9. The location of every water service shall be marked with an "W" directly above the service and shall be stamped into the face of the curb. The "W" shall be 2 inches in height and ¼ inch in depth.

10. Stainless steel insert, meter setter and meter per the Standard Details, meter box with a brick at each corner, and lid shall be placed at correct depth and distance from sidewalk. Water services shall be placed a maximum of 2 feet from a property line. The meter shall be accessible from inside of the meter box.

11. Plastic service pipe shall not be heat-flared. Because of the variation in the outside diameter of the pipe, a saddle tap in lieu of the Quiktap may be required.

12. Special care shall be used to ensure that adequate compaction is provided under curbs so that the box is vertical and the meter idler is level. Compaction shall be made under and around the meter box so it remains level and at the finished sidewalk grade.

E. Fire Hydrants

Fire hydrants shall be installed every 300 feet and on all water main dead ends in conformance with the requirements of the City of Ceres Engineering Division, Department of Public Works, and Emergency Services.

F. Blow-offs

Blow offs shall not be installed without approval from the City Engineer and the Director of Public Works. All salvaged temporary blow-offs shall become the property of the contractor and shall be removed from the job site

G. Connections to Existing Mains

1. All connections to the city water main shall be made using the hot tap procedure.

2. Hot tap procedures;
    i. Install tapping sleeve or saddle, tapping gate valve or corporation stop as per manufacturer's recommendations.
        a) For 3" and larger tapping gate valves, pressure test shall be performed at 150 psi for 30 minutes to test the gate valve and tapping sleeve before tap is made.
    ii. Tapping shall be performed by a contractor licensed to perform such work. Contractor shall furnish city representative with 3 references of like work, these references must be approved and verified prior to work beginning.
    iii. Once tap is complete, return coupon to city representative.

3. For all main line extensions 3" and above, a temporary double check valve backflow assembly shall be installed as per city standard for construction purposes and removed once project has been accepted by the city inspector. The size of the backflow device to be installed shall be at the discretion to the contractor to insure proper flow rates for flushing of new piping system.
    i. Backflow device shall be supplied by the contractor and tested by city staff once installed. No water shall be introduced into the new pipeline until the backflow device has been tested and certified by the city.
        a) The City of Ceres Water Department reserves the right to test this backflow device at any time. Should any test fail, pipeline shall be shut down until repairs have been made, City staff will re-test.

4. For all connections to the City's Water System 3" and larger, greater than 30' in length shall follow all Disinfection/Bacteria Testing/Pressure Testing procedures as show below. For all connections 3" and larger, less than 30' in length, pipe and fittings shall be thoroughly swabbed.

5. Point of connection for water services used for Domestic, Irrigation, and Fire shall be at the property line. Meters and backflow devices shall be placed at the point of connection and it will be the owner's responsibility to maintain all on site improvements.

6. Any new main water line extensions, Tee's shall be installed at all intersections and fire hydrant runs. On all tee's, 3 valves shall be installed.

H. Disinfection/Bacteria Testing/Pressure Testing

i. These procedures shall be done on water line extensions from the City's water main 3" and larger in size.
ii. Disinfection shall be performed by the contractor in a method that produces a 50 PPM chlorine dosage. Prior to the start of work, contractor shall submit a disinfection plan to the City engineer. Once the pipe, hydrants, and services have been installed, the pipe shall be filled with water in a method that no air exists, this shall be monitored by the city inspector. This water shall sit for 24 hours.
iii. Pressure testing of the system shall be done at this time. Testing shall be 150 psi and hold for 2 hours. This test shall include all main water lines, hydrants, and services, greater than 30' in length.
iv. After the new piping system has sat for 24 hours with a 50 ppm chlorine dosage, flushing shall begin. The first water flushed shall be tested by the city inspector to insure a minimum of 20 PPM residual remains within the piping system. Should the residual test be lower than 20 ppm at this point, the disinfection process shall be re done. Once flushing begins, all waters shall be de chlorinated before it enters any right of way. Amount of water flushed shall be total volume of the pipe flushed 3 times. This shall be measured by a meter installed at the very end of the piping system supplied by the contractor and verified by the city inspector. After the piping system, hydrants, and services have all been flushed, the water shall sit in the pipe for 24 hours.
v. After the 24 hour period, a bacteriological sample shall be taken from the first water being flushed. This water shall be less than 4 ppm residual and this shall be measured by the city inspector. Bacteria samples shall be taken by a certified lab. If the bacteria test result is positive for coliform, the process of disinfection and flushing shall start over. For main line extensions, all sampling shall be done at fire hydrants located no more than 1,200 feet apart.
    a) The disinfection, sampling, pressure testing and re test for any failures are all to be done at the expense of the contractor. The City will not approve or sign off any project until all tests have been completed and passed. For any positive bacteria sample, pressure test failure, present a corrective plan to the City prior to commencing work.

I. Sample Stations

Sampling methods shall be performed in conformance with AWWA C651- 99, Section 5.

Sampling stations shall be served by a 1 inch service installed as shown in the Standard Details; a meter idler assembly is not required. The testing nozzle shall be threadless and shall be between 36 inches and 48 inches in height.

All sampling stations shall be installed as shown in the Standard Details. The piping from the curb stop to the nozzle shall be of brass, copper or Schedule 40 Polyvinyl Chloride Pipe. All piping that is above grade shall be insulated with foam pipe insulation. All station housings shall be Kupferle Foundry - Mainguard 91, Koraleen Enterprises - Station Guard, Max Fusion, or an approved equal.

Water Quality Sampling stations shall be installed by the developer at the sole discretion of the City Engineer.

J. Private Fire Protection System

1. Thrust blocking shall be installed. Other joint restraints shall be installed in conformance with NFPA 24.

2. Fire Department Connections

a. Except for residential systems with less than twenty heads, every sprinkler system shall be installed with an approved fire department connection (FDC), with internal National Standard (NST) treaded swivel fittings. Listed caps shall be provided. All fire department connections shall be easily accessible, without interference from buildings, fences or other objects.

b. A listed check valve shall be installed in each fire department connection.

c. A fire department connection shall be installed on the system side of the system check and control valves, and on each side of a sectional valve.

d. The fire department connection shall not be connected to the suction side of a fire pump.

e. Parking shall be prohibited in front of and within 20 feet of the hose connections. Fire department connections shall be located between 18 inches and 48 inches of adjacent grade or access level; and where possible shall be located within 90 feet of a fire hydrant.

f. Two 2 inch hose connections shall be supplied by a 4 pipe when the riser is 4 inches or larger; a single 2 inch hose connection supplied by a 3 inch pipe may be used when the riser is 3 inches or smaller.

3. Approval Procedure

a. Underground fire services for fire hydrants and/or automatic fire protection systems shall be included in civil drawings or on the site plan at time of submittal for a building permit. Plans shall include piping from the street connection to termination at a building or at a hydrant, or both. Locations of existing (or proposed new) off-site fire hydrants, fire department connections, and approved shut-off valve shall also be shown.

b. Aboveground automatic fire sprinkler and standpipe system plans may be submitted separately to the Fire Department after the building permit for the

structure is issued. A separate permit is not required unless the fire sprinkler installation is the only work being done.

c. All fire sprinkler systems shall be designed and installed in accordance with NFPA Standard 13; all standpipe systems shall be designed and installed in accordance with NFPA Standard 14.

d. Plans shall be approved by Fire Department prior to start of construction.

e. A minimum of three sets of complete plans shall be submitted.

4. Inspection and Test Procedures

a. All required inspections and tests shall be witnessed by the Fire Department. The contractor has the responsibility to schedule and to be present during all inspections and tests. The contractor shall contact the Fire Department 48 hours (2 working days) prior to inspections or tests to schedule an appointment.

b. One set of the approved project plans shall be kept on the job site during construction.

c. All private fire system trenches, piping, joints, valves and pipe restraints (thrust blocks or other approved method) shall be inspected by the City prior to covering.

d. All private fire main piping, supplying only fire hydrants, shall be hydrostatically tested at 150 pounds per square inch for 1 hour; all fire main piping supplying a sprinkler system shall be hydrostatically tested at 200 pounds per square inch for 2 hours. This test will be against a blind flange (skillet). The pipe shall only be backfilled between joints during this test so that leaks can be easily detected. Connection to the approved backflow device will not be made until this test has been completed.

Table 5.6 Flow Rate to Produce Velocity of 10 feet per second

Pipe Size (inches)	Flow Rate (gallons per minute)
4	390
6	880
8	1560
10	2440
12	3520

e. The main shall be thoroughly flushed to remove foreign materials. The minimum flow rate shall be the water demand rate of the system or at a velocity of 10 feet per second, whichever is greater.

f. All fire hydrants shall be installed and tested prior to building construction. The fire hydrant shall have unobstructed access and shall be maintained.

K. Excavation and Backfill

All excavation and backfill for pipeline installation shall be in accordance with these specifications.

5-1.04 MEASUREMENT AND PAYMENT

Water main shall be measured horizontally by the linear foot through valves and fittings. Valves greater than 12 inches shall each be measured as one completed installed unit in operable condition including valve, anchor block, valve box and riser. Valves 12 inches and smaller shall be considered in the unit price per lineal foot of pipe. Fire hydrants shall each be measured as one complete installed unit in operable condition including hydrant, break-off riser, bury thrust block, 6 inch valve, and piping from main to bury. Air relief and blow-off assemblies shall each be measured as one complete unit in operable condition including valve, valve box, curb stop, corporation stop, service clamp and any other necessary fittings. Fittings, anchors, and thrust blocks shall not be measured for payment. The contract price for water main and appurtenances shall be full compensation for all labor, execution, backfill, materials, and tests necessary to furnish and install the main and appurtenances in accordance with the approved project plans and specifications.

CHAPTER - 6

STREETS – STREET LIGHTING

STREETS

6-1.01 GENERAL

This work includes furnishing of all labor, materials, tools, and equipment to construct and complete the installation of streets, curbs, gutters and sidewalks in accordance with the approved project plans, the City Standard Details, these specifications, the State Standard Plans and the State Standard Specifications.

6-1.02 MATERIALS

A. Engineering Fabrics

This work includes furnishing all labor, materials, tools and equipment necessary to place engineering fabric in accordance with the approved project plans and these specifications. Engineering fabrics shall include pavement reinforcing fabric and light-duty road stabilization fabrics. A Certificate of Compliance from the product manufacturer for the engineering fabric shall be furnished to the City Engineer. Engineering fabrics shall be delivered and stored in protective covers to shield against ultraviolet rays, abrasion, and water.

1. Paving Fabric

Paving fabric shall be manufactured from polyester, polypropylene, or polypropylene-nylon material. The fabric shall be non-woven and heat bonded on the top side, and shall conform to the provisions of Table 6.1.

Table 6.1 Paving Fabric

Property	Minimum Requirements	Test Method
Grab Strength	100 pounds	ASTM D4632
Elongation at Break	50%	ASTM D4632
Asphalt Retention	0.2 gallons per square yard	ASTM D6140
Thickness	30 to 100 mils	ASTM D461
Melting Point	325 ºF	ASTM D276

2. Road Stabilization Fabric

Road stabilization fabric for light duty applications shall be manufactured from polyester, nylon, or polypropylene material, or any combination thereof. The fabric shall be woven or non-woven, permeable, and shall conform to the equivalent of Mirafi HP370.

B. Aggregate Base

Aggregate base shall conform to §26, Aggregate Bases of the State Standard Specifications and shall be Class 2, ¾ inch maximum. The section shown on the approved project plans shall be the minimum section allowed.

C. Asphalt Concrete

Asphalt Concrete shall conform to §39, Asphalt Concrete of the State Standard Specifications and shall be Type A Asphalt Concrete using AR4000 paving asphalt. Aggregate used in all but the final course shall be ¾ inch maximum, medium grading.

Aggregate used in the final course shall be as follows:

Expressway, Arterial, Collector and Industrial Streets – Type A, ¾ inch maximum, medium grading.

Residential Streets – Type B, ½ inch maximum, medium grading

Asphalt for 0.1 feet overlays shall be AR4000 concrete paving, Type B, ½ inch maximum, medium grading.

D. Header Board

Header boards shall be constructed to protect the edges of the asphalt concrete where streets are partially completed. All header boards shall be either redwood or Douglas Fir with an American Wood Preservers Bureau stamp indicating use for ground contact.

The header board size shall meet or exceed the depth of the asphalt concrete section.

E. Shoulder Backing

Shoulder backing shall be required on all roadways, parking lots, and header board applications where no curb or barrier is installed to prevent vehicles from encroaching onto the shoulder. The material for shoulder backing shall be imported or site material conforming to the following gradation and quality requirements:

Table 6.2 Shoulder Backing Gradation

Sieve Sizes	Percentage Passing
2 inch	100
1 inch	75 - 100
No. 4	35 - 80
No. 30	15 - 55
No. 200	5 - 25

Table 6.3 Shoulder Backing Quality

Specification	California Test	Minimum Requirement
Sand Equivalent	217	10
Resistance (R – Value)	301	40
Plasticity Index	204	8

The areas where shoulder backing is used shall be cleared of all weeds, grass and debris. The shoulder backing shall be moisture conditioned to 3% over optimum and shall be compacted to 95% of the maximum dry density.

Shoulder backing shall not be deposited on the new surface prior to placing the backing in its final position. The backing shall not be bladed onto the new surfacing during mixing, watering and grading operations.

Shoulder backing shall be completed along the edges of any portion of new surfacing within 5 days after completion of the new surfacing.

F. Sidewalks, Curbs, Gutters, Curb Ramps, and Driveways

Sidewalks, curbs, gutters, curb ramps, and driveways shall be constructed of 5 sack (28 day strength, 2500 pounds per square inch) Portland cement concrete and shall be Type II cement, with a 4 inch maximum slump and a 1 inch maximum aggregate size.

G. Truncated Domes

The contractor shall furnish and install truncated dome tiles as detectable warnings on the curb ramps, as shown on the approved project plans. The tiles shall be either Vitrified Polymer Composite (VPC) Cast-In-Place Tiles manufactured by Armor-Tile Tactile Systems (1-800-682-2525), E-Z Set Ceramic Composite Detectable Warning Panels manufactured by Detectable Warning Systems or an approved equal.

The truncated dome tiles shall comply with the following:

a. Dome Alignment - Square grid pattern in the predominant direction of travel.

b. Dome Size - Base diameter of 0.9 inch minimum to 1.4 inch maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2 inch.

c. Dome Spacing - Center-to-center spacing of 1.6 inch minimum and 2.4 inch maximum, and a base-to-base spacing of 0.65 inch minimum, measured between the most adjacent domes on square grid.

d. Color - The tiles shall be uniform in color and as specified in the approved project plans.

e. Tile Size and Location - The truncated dome tiles shall extend 24 inches in the direction of travel and for the full width of the curb ramp as shown on the plans. The contractor may use 2.4 inch by 2.4 inch or 2.4 inch by 4.8 inch tiles. The edge of the detectable warning surface nearest the back of curb line shall be 6 inches minimum and 8 inches maximum from the back of curb line.

H. Bus Turnouts

Bus turnouts shall be constructed as shown in the City of Ceres Standard Details. The minimum concrete mix design standards shall be 4,000 pounds per square inch with a maximum water/cement ratio of 0.42 and a flexural design strength of 600 pounds per square inch (as measured by ASTM C 78-02) and a maximum slump of 3 inches.

A midrange water reducer/superplacticizer may be used to increase the slump to a maximum of 6 inches. The slope of the bus turnout parallel to the roadway shall match the slope of the roadway. A maximum cross slope of 2% is allowed perpendicular to the roadway in the passenger loading area.

1. Concrete Mix Design

Minimum cement content: 6 sack
Maximum fly ash: 15%
Maximum aggregate: ¾ inch
Minimum polypropylene fibers content: 0.1% by volume (1.5 pounds per cubic yard)

2. Polypropylene Fiber

The Portland cement concrete shall be reinforced with polypropylene fibrillated fibers. The fibers shall be 100% virgin polypropylene fibrillated fibers. Fiber shall be Fibermesh InForce e3 as manufactured by SI Concrete Systems, or an approved equal.

6-1.03 EXECUTION

A. Geosynthetics

Geosynthetics shall be installed in accordance with §96-1.02J, Paving Fabric of the State Standard Specifications.

B. Road Stabilization Fabric

1. The subgrade to receive the geotextile fabric, immediately prior to placing, shall conform to the compaction and grade requirements as shown on the approved project plans.

2. Geotextile fabric shall be handled and placed in accordance with manufacturer's recommendations.

3. The fabric shall be aligned and placed in a wrinkle-free manner.

4. Adjacent borders of the fabric shall be overlapped a minimum of 12 inches or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches shall number 5 to 7 per inch of seam.

5. The fabric shall be covered with aggregate base within 24 hours after the fabric has been placed.

6. During spreading and compaction of the aggregate base a minimum of 6 inches of the base shall be placed between the fabric and the contractor's equipment. Equipment or vehicles shall not be operated on or driven over the fabric.

C. Subgrade Preparation

1. All clods shall be broken and all rocks, hard ribs, and earth lumps over 2½ inches in greatest dimension shall be removed from the jobsite.

2. On industrial streets or where the Traffic Index equal to or greater than 10, relative compaction of not less than 95% is required for a minimum depth of 2.5 feet below subgrade finish grade.

3. For all other streets, the subgrade material shall be compacted to a firm stable condition until a relative compaction of not less than 95% has been obtained to a minimum depth of 6 inches below the proposed finish grade for the full width of the street. Locations and depths of existing utilities may require alternate construction methods as approved by the City Engineer.

4. The finish grade shall not vary by more than 0.1 feet above or below the proposed grade.

5. Relative compaction shall be tested by the contractor at his expense, as directed by the City Engineer and in accordance with California Test 216 (maximum wet density) or California Test 231 (relative compaction). The test results shall be provided to the City Engineer.

D. Aggregate Base

The finish grade of the aggregate base shall not exceed 0.1 feet above or below the proposed finish grade as shown on the approved project plans. The surface shall be uniform and free from sharp breaks. The cross-section of the base shall be free from ridges or valleys and be within 0.1 feet above or below the theoretical section shown on the plans at any point on the cross-section. Surfaces will be tested with a 16-foot straight edge applied parallel to and at right angles to the roadway centerline. The contractor shall furnish the straight edge for the City Engineer's use, and it shall be of a type and in a condition approved by the City Engineer. Relative compaction shall be determined in accordance with California Tests 216 and 231. Upon the recommendation of the contractor, alternative test methods may be recommended for use, as approved by the City Engineer.

E. Asphalt Concrete

Asphalt concrete shall be spread in conformance with §39-2, Spreading and Compaction of the State Standard Specifications.

1. The following conditions shall apply to all paving in public streets:

   a. The final course shall be paved starting from the curb and progressing toward the centerline of the street.

   b. When paving the final surfacing course, there shall be a minimum of two rakers and one screed person per paving machine.

   c. Vibratory rollers may be used as approved by the City Engineer.

   d. All paving courses shall be laid with a paving machine, except as otherwise approved by the City Engineer.

   e. Paving machines shall have automatic joint controls.

   f. Extensions or wings shall not be permitted except as approved by the City Engineer.

2. Penetration Treatment, Prime and Tack Coats: (when required by conditions or specifications)

Table 6.4 Prime and Tack Coat Specifications

Type	Asphalt Grade	Rate (gallons per yard)
Prime	SC-250	0.25
Tack	CSS-1 (slow setting)	0.02 to 0.1

A tack coat may be required between asphalt concrete lifts when traffic has used the paving surface.

3. Adjustment of Utility Covers: All utility covers structures including manholes, cleanouts, blow-off and water valve boxes shall be lowered prior to any pavement planning and shall be brought to finish grade after the final pavement lift has been installed.

4. Mix Design: The contractor shall ensure that the asphalt concrete suppliers have an approved Mix design on file with the City of Ceres prior to paving.

5. Spreading and compacting equipment shall be as specified in §39-2, Spreading and Compacting Equipment of the State Standard Specifications. The State Standard Specifications are amended by these specifications to allow for the use of a motorized latent box for projects involving less than 50 tons of asphalt concrete.

F. Header Board

Backfill shall be shoulder backing and shall be mechanically compacted. When a header board is being installed as part of a half-street construction, the contractor shall have the option to extend the full pavement section an extra 2 feet from the specified dimension providing that there is sufficient right-of-way to extend the pavement section an additional 2 feet (as determined by the City Engineer).

G . Shoulder Backing

The top 12 inches of shoulder, for a minimum distance of 4 feet from edge of pavement, shall be scarified and compacted to 95% of the maximum density and at 3% over the optimum moisture content.

H. Sidewalks, Curbs, Gutters, Curb Ramps, and Driveways

Work shall conform with §73, Concrete, Curbs and Sidewalks of the State Standard Specifications.

1. General - Curb ramps shall be installed at all street crossings and curb returns. All cuts to existing concrete shall be made and replaced from a score line or expansion joint. Any cuts to existing driveways require the removal and replacement of the full drive approach (or from an existing score line to a score line.)

2. Subgrade Preparation - The finished subgrade, prior to placement of aggregate base or concrete, shall be compacted to 90% relative compaction at 3% over optimum moisture content for a depth of 0.5 feet.

3. Cushion (if specified) - Shall be compacted Class 2 aggregate base.

4. Lumber used for forms must be smooth on the side placed next to the concrete and shall not be less than 1½ inches thick. Warped forms and forms not having a smooth, straight upper edge shall not be used. Benders or thin planks, rigidly placed, may be used on curves, grade changes, or the curb returns.

   All forms shall be clean and coated with a light oil to prevent the concrete from adhering to them. All forms shall be set to grade and alignment and shall be rigidly held in place. Clamps, spreaders and braces shall be used where required to ensure rigidity in the forms.

   Forms shall not vary from vertical grade by more than 0.02 feet and from horizontal alignment by more than 0.05 feet within the distance not to exceed 25 feet. All forms shall have smooth even lines in both the horizontal and vertical plane. A windrow of earth placed against the forms prior to placing concrete may be required to prevent them from bulging. Except for vertical curb forms, all forms shall remain in place for at least 12 hours after the concrete is placed.

5. Extruded Sidewalk, Curb and Gutter - Use of an extrusion machine is allowed. A test pour may be required by the City Engineer prior to approval.

6. Placing and Finishing - Concrete shall not be placed or finished in the rain.

7. At the end of each day's pour, when work is terminated, or when a delay of more than 30 Minute occurs, the joint shall be made vertical and square ended. In no case shall the end of a day's pour end at a driveway.

8. Expansion joints, weakened plane joints, score lines - Expansion joints shall be constructed in conformance with §303.5.4.2, Expansion Joints of the Standard Specifications for Public Works Construction (SSPWC); at the end of each curb return and at intervals not to exceed 200 feet.

   If an existing sidewalk is cut to install new driveways and approaches then expansion joints shall beconstructed on each side of the driveway or approach.

   Weakened plane joints shall be constructed in conformance with §303-5.4.3, Weakened Plane Joints of the SSPWC at 8 feet intervals and at each end of the driveway approaches.

   Monolithic pour/placement of curb, gutter and sidewalk are not allowed.

When making new curb cuts, replacing existing curb, or placing new concrete curb in existing asphalt, the asphalt shall be cut a minimum of 6 inches from the lip of the curb.

Sidewalk - Expansion joints for new construction shall be situated in line with expansion joints placed for the curb and gutter.

Expansion joints placed in sidewalks where curbs and gutters exist shall be placed to match the expansion joints in the existing curb and gutter.

Sidewalk score lines shall conform to score lines of existing sidewalks when new construction is placed contiguous and in line with existing sidewalk or as indicated on the approved project plans.

Weakened plane joints shall be constructed at a maximum interval of 8 feet for a 4 feet wide sidewalk and 10 feet for other sidewalk widths. The depth of weakened plane joints shall be a minimum of 25% of the thickness of the concrete. Concrete shall be scored at equal intervals between the weakened plane joints to approximate squares. The concrete shall be surfaced with a medium broom finish.

Driveways & Approaches - When the back of an approach is poured against existing concrete, a ¼ inch, pre-molded expansion joint shall be placed against the existing concrete. New score lines shall correspond with the score lines of the adjacent sidewalk.

9. Exposed Aggregate Sidewalk - Exposed aggregate sidewalk shall conform to these specifications for concrete sidewalk except for the surface finish.

   Exposed aggregate sidewalk may be seeded with 3/8 inch maximum aggregate embedded in the surface of the concrete by tapping or rolling. A standard mix with 60% minimum – 70% maximum aggregate content and 3/8 inch minimum – ½ inch maximum aggregate screening may be used. The aggregate shall be exposed by washing away the surface mortar.

   The finished surface shall contain 40-60% exposed, crushed aggregate. The same source rock shall be used for the project frontage. If a concrete retarder is desired then the contractor shall obtain approval from the City Engineer.

10. Service and Lot Lines – The contractor shall mark a "W" for water services and a "S" for sewer services on the curb as per the City of Ceres Standard Specifications.

11. Testing - The finished concrete shall be in conformance with the tolerances as stated in §40- 1.135, Pavement Thickness of the State Standard Specifications and attain a minimum 28- day compressive strength of 3000 pounds per square inch. Core testing of substandard concrete will not be permitted.

    Gutters shall be checked by flowing water. The City Engineer shall be present during the flow test. High spots or depressions revealed by the flow test (which exceed 0.02

feet) shall be repaired by removing that section of concrete and replacing it to the correct grade.

Finished face of curb shall not vary by more than an aggregate total of 0.05 feet from the design alignment within a distance of 25 feet.

I. Truncated Domes

The contractor shall construct on the project site, a test detectable warning surface using the selected truncated dome tile for the project. The minimum surface area shall be 24 inches by 48 inches. The test surface shall be constructed to the satisfaction of the City Engineer, before the selected tile and installation procedure will be accepted for the project.

The truncated dome tiles shall be installed per the manufacturer's written recommendations and specifications. The tiles shall be flush with the surrounding surface of the curb ramp. The ramp surface shall not have any concrete bulges or deposits associated with the installation of the tiles.

The contractor shall submit a certificate of compliance for the truncated dome tiles certifying that the tiles conform to ADA requirements and strength requirements. A warranty shall be provided for defects in materials and manufacturing. The contractor shall submit a document from the tile manufacturer, certifying that the contractor (or subcontractor) is qualified for installation and has successfully completed tile installations similar in material, design, and extent to that used for the project.

J. Bus Turnouts

1. Placing and Finishing Concrete in Hot Weather - Hot weather is defined as any combination of air temperature, relative humidity, and wind velocity that, in the opinion of the City Engineer, may impair the quality of fresh or hardened concrete or otherwise result in abnormal properties. The contractor shall take measures to minimize the effects of relative humidity, ambient air temperature, wind speed and concrete temperature on the finishing and curing of concrete. The contractor shall take precautions to minimize the rate of surface evaporation when any combination of air temperature, relative humidity, concrete temperature, and wind velocity results in evaporation rates that exceeding 0.1 pounds per square foot per hour.

These measures include, but are not limited to, the following:

a. Fog or sprinkle water on forms, reinforcing steel and subgrade prior to concrete placement.

b. The subgrade should be moist but free of standing water and soft spots at the time of placement of concrete.

c. Whenever possible, erect temporary windbreaks to reduce wind velocity over the

concrete surface.

d. Place concrete in the early morning.

e. Provide sufficient workers to eliminate delays during construction.

f. Apply final curing immediately after final finishing.

g. Schedule transit-mix trucks for minimum wait time.

h. Minimize total mixing.

2. Concrete Curing - The method(s) of curing shall comply with §90-1.03B, Curing Concrete of the State Standard Specifications. Curing compound shall be pigmented and comply with §90-1.03B(3), Curing Compound Method of the State Standard Specifications.

3. Concrete Finish - The concrete bus turnout shall receive a medium to heavy broom finish. The texturing equipment shall provide corrugations that are between 1/16 inch and 1/8 inch in depth, uniform in appearance, and are parallel to the slope of the concrete slab.

4. Control Joints - Joint lines for the concrete bus turnout and curb and gutter shall be laid out and marked before concrete pavement and curb and gutter is poured and placed. The City Engineer shall inspect and approve the joint layout before the concrete is placed. Joint lines shall run continuously across the length and width of the concrete bus turnout and extend through the curb and gutter. Joint spacing in the 50 feet straight portion of the bus turnout shall not exceed 10 feet. For rectangular concrete, the long dimension shall not exceed 1.5 times the short dimension. (Example: the short dimension equals 10 feet in length, the long dimension shall not exceed 15 feet.) The depth of saw-cut or formed groove for transverse and longitudinal joints shall be one-fourth the thickness of the concrete slab. Transverse and longitudinal control joints shall be made by the sawing method.

5. Sawing Control Joints - The contractor shall saw cut the concrete bus turnout as early as possible to minimize the potential for cracking. The contractor may use either conventional wet cut (water injection) saws, conventional dry cut saws or early entry dry cut saws. If the former method is used then joints shall be cut within 4 hours after the concrete slab has been finished. If the later method is used then joints shall be cut within 1 to 2 hours after the concrete slab has been finished.

   After sawing the control joints, the contractor shall immediately flush the control joints with water to remove the majority of the concrete slurry. After the control joint has dried sufficiently, the Contractor shall sandblast the control joints to remove any remaining dirt, dust, residue and any other foreign material.

6. Control Joint Sealant - The contractor shall not install control joint sealant until the City Engineer has inspected and approved the joints. The contractor shall apply a cold-pour single-component self-leveling silicone sealant in the control joints shown, detailed or noted on the approved project plans. The contractor shall install the joint sealant material according to the manufacturer's recommendations. The control joint sealant shall be installed one quarter inch below the finished surface of the concrete pavement.

7. Concrete testing - Testing shall be performed per Chapter 90, Concrete of the State Standard Specifications.

6-1.04 MEASUREMENT AND PAYMENT

A. Engineering Fabric

Engineering fabric will be measured by the square yard of area covered, excluding additional fabric required for overlap.

Payment for engineering fabric shall be based on the contract unit price and quantity installed as described above. The contract unit price shall include furnishing all labor, materials, tools, equipment, and incidentals and for performing all the work involved in installing the engineering fabric, as presented in these specifications and as directed by the City Engineer.

B. Subgrade Preparation

Quantities of subgrade preparation to be paid for by square footage will be calculated on the basis of the dimensions shown on the plans and adjusted by the amount of any change directed by the City Engineer. Allowance will not be made for subgrade preparation outside of those dimensions unless approved by the City Engineer. Payment shall include full compensation for furnishing all labor, materials, tools, water, equipment and incidentals, and for completing all work involved in subgrade preparation.

C. Aggregate Base

Quantities of aggregate base to be paid for by the cubic yard will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change directed by the City Engineer. Allowance will not be made for aggregate base placed outside of those dimensions unless approved by the City Engineer.

Quantities of aggregate base will be paid for at the contract unit price per cubic yard for the class or classes involved. The prices and payments shall include full compensation for furnishing all labor, materials (including water in the material at the time of weighting as provided in §26-1.06, Measurement of the State Standard Specifications), tools, equipment, and incidentals and for doing all the work involved in hauling and constructing aggregate base, complete in place as shown on the plans, and as presented in these specifications and as directed by the City Engineer.

D. Asphalt Concrete

Asphalt concrete shall be measured by the ton as placed on the street, driveways, and other areas designated by the City Engineer.

Payment shall be made as per §39-3.05D, Payment of the State Standard Specifications.

E. Header Board

Measurement will be per the approved project plans on a linear foot basis.

F. Shoulder Backing

No measurement is necessary. Full compensation for conforming to the requirements of this section shall be considered as included in the unit price bid for the roadway.

G. Curbs, Gutters, Sidewalks, Curb Ramps, and Driveways

Quantities of concrete in curbs, gutters, sidewalks, curb ramps, and driveways shall be measured and payment made at the bid price per unit as shown on the bid sheet. Curbs and gutters shall be measured continuous through driveways (approaches) and through curb ramps. Approaches shall be measured to the "back of curb line" when payment is made by the square foot. Payment shall include full compensation for the furnishing, placing, and curing of the concrete together with the excavation, cushion material and all incidentals.

H. Truncated Domes

The cost of truncated dome tiles, the full compensation for furnishing all labor, materials, tools, equipment, and for doing all the work involved in installing truncated domes tiles complete in place as shown on the plans, as specified in these specifications and as recommended by the manufacturer shall be included in the unit price of each curb ramp and no additional compensation shall be allowed.

I. Bus Turnout

Measurement for bus turnouts shall be by the cubic yard. Payment shall include full compensation for all labor and materials for completing the work.

J. Curbed Medians

Measurements for curbed medians shall be by the linear foot. Payment shall include full compensation for all labor and materials for completing the work.

STREET LIGHTING

6-2.01 GENERAL

This work includes the furnishing of all labor, materials, tools and equipment to construct and complete the installation of the street lighting and electrical system in accordance with the approved project plans, these specifications, the City Standard Details, and the State Standard Specifications and State Standard Plans.

Electrical equipment shall conform to the requirements of the National Electrical Manufacturer's Association. Material and work shall conform to the requirements of the National Electrical Code, the Electrical Safety Orders of the Division of Industrial Safety, Department of Industrial Relations of the State of California; the Rules for Overhead Line Construction G.O. 95, State of California, Public Utilities Commission, the Standards of the American Society for Testing Materials and the American National Standards Institute.

6-2.02 MATERIALS

A. Poles and Arms

All street light poles and arms shall be hot-dip galvanized steel unless noted otherwise in the plans. Poles shall be foundation mounted and shall not be painted. Twenty-five feet poles with 12 feet arms shall be Ameron Catalog No. N-2512 or an approved equal. Pole tops and base covers shall be furnished and installed with each pole. If the pole is not located at the back of the sidewalk then the length of the luminaire arm shall be as directed by the City Engineer. Poles shall have hand-holes near their bases.

B. Luminaires

The luminaires shall be as follows or an approved equal:

LEDWAY Model# STR-LWY-2M-HT-06-UL-SV-700

Luminaries is LED driver, have power factor >90% and THD <20% at full load, with a built-in receptacles for photoelectric cells.

C. Foundations

Foundations shall be constructed of Portland cement concrete as per the State Standard Specifications and shall be located as shown on the approved project plans and as per the State Standard Details. The area around each foundation shall be backfilled and compacted per the requirements of the project soils engineer. The concrete shall have a minimum 28-day compressive strength of 3,000 pounds per square inch.

D. Conductors

Conductors shall be No. 10 AWG copper or larger, THWN single conductor, Underwriters Laboratory approved.

E. Conduits

Conduit and fittings shall be schedule 40 PVC electrical conduit in locations where approved by National Code, 1½" minimum diameter, as shown on Standard Detail L-1. All fittings installed in concrete shall be of the concrete tight type.

F. ID Number

All street lights and park trail lights shall have an identification number on the pole. The identification number shall be installed per the approved project plans.

G. Wood Pole Mount

Where use of existing wood poles is approved by the City Engineer then brackets for street lights mounted on wooden utility poles shall be Ameron Catalog No. 961-15N2 or an approved equal. Brackets shall be 15 feet long.

H. Pull Boxes

All pull boxes shall be No. 5 Pull Box per Caltrans Specifications or an approved equal with bolt-down lids. All pull box lids shall identify the circuit as Street Lights. Traffic lids shall be used when pull boxes are placed in areas traveled by vehicles. The traffic lids shall be ¼ inch galvanized steel plate with ½ inch diameter light hole and bolt holes to match standard stud bolts.

I. Ballast

All street lights shall have regulator ballasts and shall be 120 volt operational.

J. Trenching

Trenching for street lights shall be in a dedicated trench. The depth of the trench shall be as per the approved project plans.

K. Photo Electrical Control

Photoelectric cells shall be adjustable, compatible with related equipment and adequate for the load. Cells shall be Fisher Price No. 6690B or an approved equal. Photo electric control shall be placed at decorative light controllers with multiple 30 amp contactors for residential and downtown installations. There shall be nor more than five contactors per cabinet.

L. In-Line Fuse Holders

Fused splice connectors shall be installed on poles. All splices shall be made with wire connections, ITT No. 10-604, 10-606 or 10-6010 or an approved equal. Cabinet locations for light circuits shall be approved by the City Engineer and as shown on the approved project plans.

M. Fuses

All fuses to be rated at 15 amp unless otherwise directed by the City Engineer. The fuse shall be the slow blowing type.

N. Anchor Bolts

Anchor bolts shall be 1 inch in diameter, 36 inch long with a 4 inch hook at the bottom end. Anchor bolts shall conform to ASTM A307.

O. Service Connections

Materials required to connect street lighting circuits to the Turlock Irrigation District (TID) power shall be supplied by the contractor and forwarded to TID. These materials will be used from the power source on the pole to the fuse holder in the light pole.

6-2.03 EXECUTION

A. Foundations

1. Foundations shall be placed monolithically to within 4 inches below sidewalk grade. After the pole is installed, a 36 inch square cap shall be placed to bring the top of the foundation to sidewalk grade.

2. In areas of reconstruction, all work on foundations must conform to § 90-1.02B of the State Standard Specifications. Sidewalk grade may be lowered a maximum of 2 inches. The base of the standard shall not be more than 2 inches above grade. Where the new grade will be higher than the original established grade, the standards may be raised as permitted by unused threads on the anchor bolts. In all cases, a full nut of threads must be maintained. Welding shall not be performed on the body of high strength anchor bolts. The base of the standards shall not be below grade. Where these specifications cannot be met, a new foundation shall be installed.

B. Conduits

1. All conductors shall be encapsulated in conduit. Underground conduit shall be Schedule 40 PVC type conforming to Article 346 of the National Electrical Code.

Schedule 80 PVC plastic conduit shall be used on wood poles; the first 10 feet shall be metal.

2. Conduit terminating in each standard or pull box shall be electrically connected to each other with a copper ground strip equivalent in area to a No. 8 AWG copper wire.

3. Schedule 40 PVC conduit may be in street area only as follows:

   a. Conduit shall be placed under existing pavement in a trench approximately 2 inches wider than the outside diameter of the conduit to be installed. Trench width shall not exceed 6 inches. The top of the installed conduit shall be a minimum of 18 inches below the top of sidewalk. All other areas shall situate the top of the conduit 30 inches below the adjacent finish grade.

   b. Street light conduit shall be installed 6 inches behind the back of curbs where no sidewalk exists, 5 feet behind the back of sidewalk except on major streets, 6 feet behind the back of curbs on major streets with or without sidewalks, or as directed by the City Engineer.

4. The outline of all areas of pavement to be removed shall be cut to a minimum depth of 3 inches. Cuts shall be neat and true with no shatter outside the removal area.

5. Conduit shall be placed in the bottom of the trench and the trench shall be backfilled with 2-sack flowable concrete slurry, to not less than 0.2 feet below the pavement surface for asphalt surfaced roadways and 0.5 feet below the pavement surface for Portland cement concrete surfaces. The top 0.2 feet of asphalt surfaced roadways shall be backfilled with asphalt concrete produced from commercial quality paving asphalt and aggregates, and the top 0.5 feet of Portland cement concrete surfaced roadways shall be backfilled with commercial quality concrete containing not less than 705 pounds of cement per cubic yard and accelerating admixtures or other provisions for high early strength. Calcium chloride shall not be used in concrete which will be in contact with metal conduit. Conduit installed under street crossings, sidewalks, into pull boxes and foundations shall be Schedule 40 PVC.

6. Exposed Conduit Installation. Run exposed conduits at right angles or parallel to structural members. Metal conduit shall be installed on the lower 10 feet of utility poles. Conduits shall be securely fastened in place. Conduits 1 inch and smaller may be secured with a one hole malleable iron strap. Conduits 1¼ inches and larger shall be secured with conduit hangers or two hole galvanized straps. All straps shall be stand-off type. Plumbers tape shall not be used to secure conduits. Provide junction or pull boxes where required for pulling conductors due to excessive numbers of bends or length of conduit runs. All unused conduit openings shall be plugged or capped. Caulking compound or wooden plugs shall not be used.

7. Where factory bends are not used, conduit shall be bent without crimping or flattening using the longest radius practicable. In no case shall the bend radius be less than six

times the inside diameter of the conduit. Light conduit connection locations on TID poles will be determined by TID.

C. Conductors

1. Conductors for 120 volt lighting shall be No.10 AWG THW copper, THWN copper wire, or as shown on the approved project plans. The neutral conductor shall be identified. AUL listed lubricant shall be used in placing conductors in conduit.

2. Conductors shall be identified with street light pole number in the service box. Identification shall be by direct labeling, tags, or bands and shall be weatherproof.

3. Conductors shall not be drawn into the conduit until the conduit run is complete and the conduit is free of debris. If the conduit is installed in a pole foundation then the conductors shall not be drawn into the conduit for at least three days after placement of the foundation concrete.

Conductors shall not be spliced except in pole bases (or in pull boxes when approved by the City Engineer). The splices shall be made as follows:

a. In pole bases, all splices shall be made with wire connections, ITT No. 10-604, 10-606 or 10-6010 or approved equal.

b. Where specifically approved by the City Engineer, splices in pull boxes shall be made using Ilson IK8 10 STP - 8 STP split bolt or an approved equal to connect wire ends. Split bolt shall be wrapped first with Plymouth Bishop 122 Rubber Tape (splicing compound) #2002 or approved equal and then with 3M 33+ electrical tape or an approved equal. The entire splice shall be coated with 3M Scotchkote electrical coating or approved equal.

D. Poles

Poles shall not be installed until the foundation has set at least five days. Poles shall be plumbed by adjusting the leveling nuts; leveling shims shall not be used. The poles shall be grounded to conform to the provisions of the National Electrical Code.

E. Connection to Electrical Distribution System

1. Where lighting circuit and energy source meet, the circuit shall terminate in TID's service boxes or pull boxes. The circuit shall terminate with a Bussman TRON fuse-holder, with a 15 amp cartridge fuse, type HEB-AB or an approved equal. All connection points shall be waterproofed.

2. For City projects, the fuse shall be taped to the cable and there shall be 4 feet of slack conductor coiled in service box.

3. TID shall make service connections for light standards in pull box. Where service is from an overhead source, TID shall supply and install conduit and cable on utility poles and make connections in pull box located at base of poles. Where service is from a TID transformer, and no service or pull box exists, the contractor shall furnish and install a pull box at transformer location, as shown on the approved project plans. The contractor shall furnish and install conduit and conductors from pull box into the TID transformer. Entrance into TID transformers shall be coordinated with, and supervised by TID.

4. The connection to either an overhead or underground energy source will be made by TID, upon receipt of request for service by the City. All necessary wiring, conduit, etc. to an existing and available power source shall be installed prior to acceptance by the City. Request for service is made upon completion of work by contractor or upon development of an adjacent property.

5. Unless otherwise requested by the City Engineer, the contractor shall deliver to the City refractors, lamps and photoelectric cells in lieu of installing them in the electroliers.

6-2.04 MEASUREMENT AND PAYMENT

A. Street Lights

Street lights shall each be measured and paid for as one complete installed unit in operable condition including concrete foundation, pole with mast arm(s), luminaire complete with ballast and lamp, photoelectric control, conductors in the pole and grounding.

B. Conduit and Conductors

Conduit plus all conductors shall be paid for by the linear foot of conduit.

C. Pull Boxes

Pull boxes shall be measured and paid for as one complete installed unit, including the base and lid.

CHAPTER - 7

STREET TREES

7-1.00 INTRODUCTION

7-1.01 References

American National Standards Institute (ANSI). Safety Requirements for Tree Care Operations. ANSI Z133.1-1994. New York: American National Standards Institute (ANSI), 1994.

American National Standards Institute (ANSI). Specifications for Acceptance of Nursery Trees at the Time of Delivery. ANSI 760.1. New York: American National Standards Institute (ANSI), 1996.

American National Standards Institute (ANSI). Performance Specifications of the Pruning of Trees Shrubs & Other Woody Shrubs. ANSI A-300 -1998. New York: American National Standards Institute (ANSI), 1998.

7-1.02 Required Practices

The Required Practices are to be implemented by the property owner, project applicant, contractor or designee and are the minimum standards by which the care of a Tree is to be administered. The Required Practices category identified throughout this specification are measures that are consistent with best management practices in the tree care industry and are intended to promote healthy, structurally sound trees. In all such cases, the Community Development Department shall, if justified by field conditions such as conflict with utilities or a public nuisance, have the discretion to modify or add to any condition, practice or standard mentioned within this specification.

7-1.03 Recommended Practices

The Recommended Practices identified throughout this specification are not mandatory, but provide additional proactive measures for the care of trees, such as fertilizing, reducing a tree hazard, protection from specific disturbances or procedures for planting trees on problem sites. Note: A recommended practice may be required if it is so specified within the 'conditions of approval' for a development project or mitigation for injury or disturbance. In all cases, the Community Development Department shall, if justified by changing field conditions such as conflict with utilities, have discretion to modify, re-designate or add to any condition, practice or standard mentioned within this specification.

7-1.04 Definitions

Certain terms that are unique to the arboricultural or construction industry are defined to provide a uniform understanding of the terms and concepts used and mentioned in this document. Words that are

defined are noted in italics throughout the document and are found in the Definitions section of this specification

7-2.00 DEFINITIONS

For the purposes of this specification the following definitions shall apply:

Appraisal: See Tree Appraisal.

Building Area: The area of a parcel that 1) upon which, under applicable zoning regulations, a structure may be built without a variance, design enhancement exception, or home improvement exception or 2) is necessary for the construction of primary access to structures located on the parcel, where there exists no feasible means of access which would avoid protected trees. On single-family residential parcels, the portion of the parcel deemed to be the building area access shall not exceed ten feet in width.

Building Footprint: The two-dimensional configuration of a building's perimeter boundaries measured on a horizontal plane at grade level.

Certified Arborist: An individual who has demonstrated knowledge and competency through obtainment of the current International Society of Arboriculture arborist certification, or who is a member of the American Society of Consulting Arborists. A certified arborist can be found through the Western Chapter of the ISA (www.wcisa.org).

City Arborist: The person designated as such by the Community Development Director.

Compaction: Compression of the soil structure or texture by mechanical means that creates an upper layer that is an impermeable ('cap'). Compaction is injurious to roots and the health of a tree (see Soil Compaction Damage).

Dangerous Tree: See Hazardous Tree.

Dead Tree: A tree that is dead or that has been damaged beyond repair or is in an advanced state of decline (where an insufficient amount of live tissue, green leaves, limbs or branches, exists to sustain life) and has been determined to be such by a certified arborist.

Designated Tree: All trees that are specifically designated by the City to be saved and protected on a public or private property which is subject to discretionary development approval (see Discretionary Development Approval of this specification), such as a variance, home improvement exception, architectural review, site and design, subdivision, etc. Designated trees are to be indicated on approved building permit or landscape plans.

Diameter at Breast Height (DBH) or **Diameter at Standard Height:** The diameter of the perimeter tree trunk at four and one-half feet (or 54 inches) above natural grade level. See 'Protected trees' for diameters of different species. The diameter may be calculated by using the following formula: DBH=

circumference at 4.5-feet x 3.142 (D=C x Þ). To determine the DBH of multi-trunk trees or measuring trees on slopes, consult the current Guide for Plant Appraisal, published by the Council of Tree and Landscape Appraisers.

Director: The Community Development Director or the Director's designee.

Discretionary Development Approval: A planned community zone, subdivision, use permit, variance, home improvement exception, design enhancement exception, or Planning Commission approval.

Disturbance: Construction or development activities that could damage trees.

Dripline Area: The area within X distance from the trunk of a tree, measured from the perimeter of the trunk of the tree at 54-inches above natural grade, where X equals a distance ten times the diameter of the trunk at 54-inches above natural grade.

Excessive Pruning: Removing in excess, one-fourth (25 percent) or greater, of the functioning leaf, stem or root area. Pruning in excess of 25 percent is injurious to the tree and is a prohibited act. Excessive pruning typically results in the tree appearing as a 'bonsai', 'lion's-tailed', 'lolly-popped' or overly thinned (see 'Standards for Pruning Protected Trees' of this specification).

Unbalanced Crown: Excessive pruning also includes removal of the leaf or stem area predominantly on one side, topping, or excessive tree canopy or crown raising. Exceptions are when clearance from overhead utilities or public improvements is required or to abate a hazardous condition or a public nuisance.

Roots: Excessive pruning may include the cutting of any root two inches or greater in diameter and/or severing in excess of 25 percent of the roots.

Hazardous Tree: A tree that possesses a structural defect which poses an imminent risk if the tree or part of the tree that would fall on someone or something of value (target)(see Determining if a tree is Hazardous, this specification).

Structural Defect: Any structural weakness or deformity of a tree or its parts. A tree with a structural defect can be verified to be hazardous by a certified arborist and confirmed as such by the City Arborist. For the purpose of tree removal information required by the City, the tree report shall include a completed ISA-Tree Hazard Evaluation. The City Arborist retains discretionary right to approve or amend a hazardous rating, in writing, and recommend any action that may reduce the condition to a less-than significant level of hazard.

Target: People, vehicles, structures or property, such as other trees or landscape improvements. A tree may not be a hazard if a 'target' is absent within the falling distance of the tree or it's parts (e.g., a substandard tree in a non-populated area away from pedestrian pathways may not be considered a hazard).

Injury: A wound resulting from any activity, including but not limited to 'excessive pruning', cutting, trenching, excavating, altering the grade, paving or compaction within the tree protection zone of a tree.

Injury shall include bruising, scarring, tearing or breaking of roots, bark, trunk, branches or foliage, herbicide or poisoning, or any other action leading to the death or permanent damage to tree health.

Monthly Inspection Report: A written report prepared by the property owner, project arborist, architect, developer, landscape architect, builder, applicant or other designated individual to document that a monthly tree inspection or any other required measure has been accomplished. The project arborist shall perform a site inspection to monitor the tree condition on a minimum interval of four weeks.

Project Arborist: A certified arborist retained by a property owner or development applicant for the purpose of overseeing on-site activity involving the welfare of the trees to be retained. The project arborist shall be responsible for all reports, appraisals, tree preservation plans, or inspections as required.

Protected Tree: Any tree that is 11.5-inches or greater in diameter (36-inches in circumference measured at 54-inches above natural grade) and trees of any size or species designated by City Council having distinctive characteristics such as great age, large, unique form or possess historical.

Protective Tree Fencing: A temporary enclosure erected around a tree to be protected at the boundary of the tree protection zone. The fence serves three primary functions:

A. to keep the foliage crown, branch structure and trunk clear from direct contact and damage by equipment, materials or disturbances;

B. to preserve roots and soil in an intact and non-compacted state; and

C. to identify the tree protection zone in which no soil disturbance is permitted and activities are restricted.

Public Nuisance: An individual tree or shrub on any private property or in any street, or a type or species apt to destroy, impair or otherwise interfere with any street improvements, sidewalks, curbs, street trees, gutters, sewers, or other public improvements, including above and below ground utilities.

Recommended Practice: An action, treatment, technique or procedure that may be implemented for superior care or preservation of trees. Recommended practices may be required under specific conditions of approval for discretionary development projects or injury mitigation.

Regulated Tree: Any Protected Tree, Street Tree or Designated Tree.

Removal: means any of the following:

A. complete tree removal such as cutting to the ground or extraction of the tree.

B. taking any action leading to the death of a tree or permanent damage to its health or structural integrity, including but not limited to excessive pruning, cutting, girdling, poisoning, over watering,

C. unauthorized relocation or transportation of a tree, or trenching, excavation, altering the grade, or paving within the drip line of the tree.

Required Practice: A mandatory action, treatment, technique or standard of care required to be implemented by the property owner, developer, contractor or designee for the preservation of trees

Root Buffer: A temporary layer of material to protect the soil texture and roots. The buffer shall consist of a base course of tree chips spread over the root area to a minimum of 6-inch depth, capped by a base course of 3/4-inch quarry gravel to stabilize 3/4-inch plywood on top.

Site Plan: means a set of drawings (e.g. preliminary drawings, site plan, grading, demolition, building, utilities, landscape, irrigation, tree survey, etc.) that show existing site conditions and proposed landscape improvements, including trees to be removed, relocated or to be retained.

Site plans shall include the following minimum information that may impact trees:

A. Surveyed tree location, species, size, drip line area (including trees located on neighboring property that overhang the project site) and street trees within 30-feet of the project site.

B. Paving, concrete, trenching or grade change located within the tree protection zone.

C. Existing and proposed utility pathways.

D. Surface and subsurface drainage and aeration systems to be used.

E. Walls, tree wells, retaining walls and grade change barriers, both temporary and permanent.

F. Landscaping, irrigation and lighting within drip line of trees, including all lines, valves, etc.

G. Location of other landscaping and significant features.

H. All of the final approved site plan sheets shall reference tree protection instructions).

Soil Consolidation: The compression of soil particles that may result from the movement of heavy machinery and trucks, storage of construction materials, structures, paving, etc. within the tree protection zone. Soil compaction can result in atrophy of roots and potential death of the tree, with symptoms often taking 3 to 10-years to manifest.

Soil Fracturing: The loosening of hard or compacted soil around a tree by means of a pneumatic soil probe that delivers sudden bursts of air to crack, loosen or expand the soil to improve the root growing environment.

Street Tree: Any publicly owned tree, shrub or plant growing within the street right-of-way, outside of private property. In some cases, property lines lie several feet behind the sidewalks. A permit from the Community Development Department is required prior to any work on or around these trees. Check with the Community Development Department to verify prior to any work near a street tree.

Target: is a term used to include people, vehicles, structures or something subject to damage by a tree. A tree may not be a hazard if a "target" is absent within the falling distance of a tree or its parts (e.g., a defective tree in a non-populated area away from pathways may not be considered a hazard.

Topping: The practice of cutting back large-diameter branches or truncating the main stem.

Tree Appraisal: A method of determining the monetary value of a tree as it relates to the real estate value of the property, neighborhood or community. When required, a certified arborist determines the appraisal by adjusting a tree's basic value by its condition, location and species using the most recent edition of the Guide for Plant Appraisal, published by the Council of Tree and Landscape Appraisers.

Tree Protection and Preservation Plan: A plan prepared by a certified arborist that outlines measures to protect and preserve trees on a project. This plan shall include requirements for pre-construction; treatments during demolition and/or construction; establish a tree protection zone for each tree; tree monitoring and inspection schedule; and provide for continued maintenance of those trees after construction according to the requirements in this specification.

Tree Protection Zone or (TPZ): The area of a temporarily fenced tree enclosure. Within the TPZ, roots that are critical for tree survival are typically found in the upper three foot soil horizon, and may extend beyond the drip line area. Protecting the roots in the TPZ is necessary to ensure the tree's survival. The TPZ is a restricted activity zone where no soil disturbance is permitted, unless otherwise approved. TPZ must be identified for each tree and shown on all applicable improvement plans for a development project. Restricted and approved activities within the TPZ.

Determining the TPZ:

Unless otherwise specified, the approved minimum TPZ shall be formulated in the following way: the TPZ radius shall be 10 times the DBH of the trunk. For example: a 2-foot DBH = a 20-foot radius from the perimeter of the trunk—or a 40-foot TPZ. The City Arborist retains discretionary right to extend or modify the TPZ at any time.

Tree Report: A report submitted to the City for review that is prepared by a certified arborist retained by the property owner or agent.

Tree Survey Report:
In the case of a discretionary development approval, a tree survey report is required to provide information about all trees on the site including: inventory of all trees, location, species, size, condition, maintenance needs, potential impacts of disturbance, recommended mitigation measures, tree appraisal value, etc..

Letter Report:
A 'letter report' shall provide a brief description of the tree information to determine whether or not a tree is dead, hazardous or constitutes a public nuisance.

Trenching: Any excavation to provide irrigation, install foundations, utility lines, services, pipe, drainage or other property improvements below grade. Trenching within the TPZ is injurious to roots and tree health and is prohibited, unless approved. If trenching is approved within the TPZ, it must be in accordance with instructions and table outlined in this specification.

Verification of Tree Protection: The project arborist shall verify, in writing, that all pre-construction conditions have been met (tree fencing, erosion control, pruning, etc.) and are in place. An initial inspection of protective fencing and written verification must be submitted to the City Arborist prior to demolition, grading or building permit issuance.

Vertical Mulching: Hydraulic or air excavation of vertical holes within a tree's root zone to loosen and aerate the soil, typically to mitigate compacted soil. Holes are typically penetrated 4- to 6-feet on center, 2- to 3-feet deep, 2- to 6-inches in diameter and backfilled with either perlite, vermiculite, peat moss or a mixture thereof.

7-3.00 PROTECTION OF TREES DURING CONSTRUCTION

7-3.01 Introduction

The objective of the material presented in this section is to reduce the negative impacts of construction on trees. Trees vary in their ability to adapt to altered growing conditions. Mature trees have established stable biological systems. Disruption of this system by construction activities may interrupt the tree's physiological processes causing depletion of energy reserves and a decline in vigor and may result in the death of the tree. This reaction can develop from one to twelve years or more after disruption. The tree protection regulations are intended to guide a construction project to ensure that appropriate practices will be implemented in the field to eliminate undesirable consequences that may result from uninformed or careless acts, and preserve both trees and property values.

Typical negative impacts that may occur during construction include:

A. mechanical injury to roots, trunk or branches
B. compaction of soil, which degrades the functioning roots and inhibits the development of new ones
   And restricts drainage, which desiccates roots and enables water mold fungi to develop
C. changes in existing grade which can cut or suffocate roots
D. alteration of the water table - either raising or lowering
E. microclimate change, exposing sheltered trees to sun or wind
F. sterile soil conditions associated with stripping off topsoil.

7-3.02 Tree Protection and Preservation Plan

Prior to commencement of a development project, a property owner shall have prepared a Tree Protection and Preservation Plan if any activity is within the drip line of a protected or designated Tree. The Tree Protection Plan should be prepared by a certified arborist and should assess impacts to trees; recommend mitigation to reduce impacts to a less than significant level and identify construction guidelines to be followed through all phases of a construction project. Projects protecting only street trees with fencing are exempt from preparing a Tree Protection and Preservation Plan.

7-3.03 Pre-Construction Requirements

The following six steps shall be incorporated within the Tree Protection and Preservation Plan prior to building permit issuance.

A. Site Plan

On all improvement plans for the project, plot accurate trunk locations and the 'drip line areas' of all trees or groups of trees to be preserved within the development area. In addition, for Protected and Street Trees the plans shall accurately show the trunk diameter, drip line and clearly indicate the tree protection zone to be enclosed with the specified tree fencing as a bold dashed line.

B. Verification of tree protection

The project arborist or contractor shall verify, in writing, that all preconstruction conditions have been met (tree fencing, erosion control, pruning, etc.) and is in place. Written verification must be submitted to and approved by the Planning Department prior to demolition, grading or building permit issuance.

C. Pre-construction meeting

The demolition, grading and underground contractors, construction superintendent and other pertinent personnel are required to meet with the Project Arborist at the site prior to beginning work to review procedures, tree protection measures and to establish haul routes, staging areas, contacts, watering, etc.

D. Protective Tree Fencing for Protected Trees, Street Trees or Designated Trees

Fenced enclosures shall be erected around trees to be protected to achieve three primary goals:

1. to keep the foliage crowns and branching structure clear from contact by equipment, materials and activities

2. to preserve roots and soil conditions in an intact and non-compacted state

3. to identify the tree protection zone (TPZ) in which no soil disturbance is permitted and Activities are restricted, unless otherwise approved .

1. Size and type of fence

All trees to be preserved shall be protected with five feet high or six feet high foot high chain link fences. Fences are to be mounted on two inch diameter galvanized iron posts, driven into the ground to a depth of at least 2-feet at no more than 10-feet spacing.

2. Area to be fenced.

Type I Tree Protection
The fences shall enclose the entire area under the canopy drip line or TPZ of the tree(s) to be saved throughout the life of the project, or until final improvement work within the area is required, typically near the end of the project. Parking Areas: If the fencing must be located on paving or sidewalk that will not be demolished, the posts may be supported by an appropriate grade level concrete base.

Type II Tree Protection
For trees situated within a narrow planting strip, only the planting strip shall be enclosed with the required chain link protective fencing in order to keep the sidewalk and street open for public use.

Type III Tree Protection
Trees situated in a small tree well or sidewalk planter pit, shall be wrapped with 2-inches of orange plastic fencing as padding from the ground to the first branch with 2-inch thick wooden slats bound securely on the outside. During installation of the wood slats, caution shall be used to avoid damaging any bark or branches. Major scaffold limbs may also require plastic fencing as directed by the City Arborist.

3. Fence Duration

Tree fencing shall be erected before demolition, grading or construction begins and remain in place until final inspection of the project permit, except for work specifically required in the approved plans in which case the project arborist or City Arborist (in the case of street trees) must be consulted.

4. Warning Sign

A warning sign shall be prominently displayed on each fence. The sign shall be a minimum of 8.5 inches by 11 inches and state: WARNING - Tree Protection Zone - This fence shall not be removed.

E. Tree Protection Zone or (TPZ)

Each tree to be retained shall have a designated TPZ identifying the area sufficiently large enough to protect the tree and roots from disturbance. The recommended TPZ area can be determined by the formula outlined (see Definitions, Tree Protection Zone). The TPZ shall be shown on all site plans for the project. Improvements or activities such as paving, utility and irrigation trenching and other ancillary activities shall occur outside the TPZ, unless authorized by the City Arborist, or by project approval. Unless otherwise specified, the protective fencing shall serve as the TPZ.

1. Activities prohibited within the TPZ include:

A. Storage or parking vehicles, building materials, refuse, excavated spoils or dumping of poisonous materials on or around trees and roots. Poisonous materials include, but are not limited to, paint, petroleum products, concrete or stucco mix, dirty water or any other material which may be deleterious to tree health.

B. The use of tree trunks as a winch support, anchorage, as a temporary power pole, sign posts or other similar function.

C. Cutting of tree roots by utility trenching, foundation digging, placement of curbs and trenches and other miscellaneous excavation without prior approval of the City Arborist.

D. Soil disturbance or grade change

E. Drainage changes.

2. Activities permitted or required within the TPZ include:

A. Mulching. During construction, wood chips may be spread within the TPZ to a 4-to 6-inch depth, leaving the trunk clear of mulch to help inadvertent compaction and moisture loss from occurring. The mulch may be removed if improvements or other landscaping is required. Mulch material shall be 2-inch unpainted, untreated wood chip mulch or approved equal.

B. Root Buffer. When areas under the tree canopy cannot be fenced, a temporary buffer is required and shall cover the root zone and remain in place at the specified thickness until final grading stage.

C. Irrigation, aeration, fertilizing or other beneficial practices that have been specifically approved for use within the TPZ.

D. Erosion Control. If a tree is adjacent to or in the immediate proximity to a grade slope of 8% (23 degrees) or more, then approved erosion control or silt barriers shall be installed outside the TPZ to prevent siltation and/or erosion within the TPZ.

F. Tree Pruning, Surgery and Removal

Prior to construction, various trees may require that branches be pruned clear from structures, activities, building encroachment or may need to be strengthened by means of mechanical support or surgery. The most compelling reason to prune is to develop a strong, safe framework and tree structure. Such pruning, surgery or the removal of trees shall adhere to the following standards:

1. Pruning limitations

A. Minimum Pruning

If the project arborist recommends that trees be pruned, and the type of pruning is left unspecified, the standard pruning shall consist of 'crown cleaning' as defined by ISA Pruning Guidelines. Trees shall be pruned to reduce hazards and develop a strong, safe framework.

B. Maximum Pruning

Maximum pruning should only occur in the rarest situation approved by the City Arborist. No more than one-fourth (25 percent) of the functioning leaf and stem area may be removed within one calendar year of any protected or designated tree, or removal of foliage so as to cause the unbalancing of the tree. Trees are individual in form and structure, and that pruning needs may not always fit strict rules. The project arborist shall assume all responsibility for special pruning practices that vary from the standards outlined in this specification.

C. Tree Workers

Pruning shall not be attempted by construction or contractor personnel, but shall be performed by a qualified tree care specialist or certified tree worker, according to specifications contained within this specification.

2.Surgery

Prior to construction, if it is necessary to promote health and prolong useful life or the structural characteristics, then trees shall be provided the appropriate treatments (e.g. cavity screening, bark tracing, wound treatment, cables, rods or pole supports) as specified by the project arborist (see ANSI A-300, Appendix G).

3. Tree Removal Procedure

When Regulated Trees are removed and adjacent trees that are to be preserved (as shown on the approved site plans) must be protected, then the following tree removal practices apply:

4. Tree Removal

Removal of trees that extend into the branches or roots of Regulated Trees shall not be attempted by demolition or construction personnel, grading or other heavy equipment. A certified arborist or tree worker shall remove the tree carefully in a manner that causes no damage above or below ground to trees that remain.

5. Stump Removal

Before performing stump extraction, the developer shall first consider whether or not roots may be entangled with trees that are to remain. If so, these stumps shall have their roots severed before extracting the stump. Removal shall include the grinding of stump and roots to a minimum depth of 24-inches but expose soil beneath stump to provide drainage. In sidewalk or small planter areas to be replanted with a new tree, the entire stump shall be removed and the

planting pit dug to a depth of 30inches. If dug below 30-inches, compact the backfill to prevent settling. Large surface roots three feet from the outside circumference shall be removed, including the spoils and backfilled with City approved topsoil to grade, and the area tamped to settle the soil.

7-3.04 Activities During Construction & Demolition Near Trees

Soil disturbance or other injurious and detrimental activity within the Tree Protection Zone (TPZ) is prohibited unless approved by the City based on a tree report. If an injurious event inadvertently occurs, or soil disturbance has been specifically conditioned for project approval, then the following mitigation is required:

7.3-05 Soil Compaction

If compaction of the soil occurs, it shall be mitigated as outlined in these specifications.

7-3.06 Grading Limitations within the Tree Protection Zone

A. Grade changes outside of the TPZ shall not significantly alter drainage to the tree.

B. Grade changes within the TPZ are not permitted.

C. Grade changes under specifically approved circumstances shall not allow more than 6-inches of fill soil added or allow more than 4-inches of existing soil to be removed from natural grade unless mitigated.

D. Grade fills over 6-inches or impervious overlay shall incorporate notes:
E. An approved permanent aeration system, permeable material or other approved mitigation is required.

F. Grade cuts exceeding 4-inches shall incorporate retaining walls or an appropriate transition equivalent.

7-3.07 Trenching, Excavation and Equipment Use Required Practices

Trenching, excavation or boring activity within the TPZ is restricted to the following activities, conditions and requirements if approved by the City Arborist. Mitigating measures shall include prior notification to and direct supervision by the project arborist.

A. Notification. Contractor shall notify the project arborist a minimum of 24 hours in advance of the activity in the TPZ.

B. Root Severance. Roots that are encountered shall be cut to sound wood and repaired. Roots 2inches and greater must remain injury free.

C. Excavation. Any approved excavation, demolition or extraction of material shall be performed

with equipment sitting outside the TPZ. Methods permitted are by hand digging, hydraulic or pneumatic air excavation technology. Avoid excavation within the TPZ during hot, dry weather.

1. If excavation or trenching for drainage, utilities, irrigation lines, etc., it is the duty of the contractor to tunnel under any roots 2-inches in diameter and greater.

2. Prior to excavation for foundation/footings/walls, grading or trenching within the TPZ, roots shall first be severed cleanly 1foot outside the TPZ and to the depth of the future excavation. The trench must then be hand dug and roots pruned with a saw, sawzall, narrow trencher with sharp blades or other approved root pruning equipment.

D. Heavy Equipment. Use of backhoes, steel tread tractors or any heavy vehicles within the TPZ is prohibited unless approved by the City Arborist. A protective root buffer may be required. The protective buffer shall consist of a base course of tree chips spread over the root area to a minimum of 6-inch depth, layered by 3/4-inch quarry gravel to stabilize 3/4-inch plywood on top. This buffer within the TPZ shall be maintained throughout the entire construction process.

E. Structural design. If injurious activity or interference with roots greater than 2-inches will occur within the TPZ, plans shall specify a design of special foundation, footing, walls, concrete slab or pavement designs subject to City Arborist approval. Discontinuous foundations such as concrete pier and structural grade beam must maintain natural grade (not to exceed a 4-inch cut), to minimize root loss and allow the tree to use the existing soil.

7-3.08 Restriction Zones For Excavation, Trenching Or Boring Within A Tree Drip line In A Planter Strip

Zone 1 Private Property

Severing roots greater than 1 inch in diameter requires approval by property owner arborist.

Zone 2 Sidewalk

Severing roots greater than 2 inches in diameter requires approval by the City Arborist.

Zone 3 Planter Strip

No mechanical digging. Severing roots greater than 2 inches in diameter requires approval by the City Arborist.

Zone 4 Curb & Gutter

Severing roots greater than 2 inches in diameter requires approval by the City Arborist.

Zone 5 Roadway
No Restrictions

7-3.09 Restriction Zones For Excavation, Trenching Or Boring within A Tree Drip line And No Curb Or Sidewalk

Zone 1 Private Property

Severing roots greater than 1 inch in diameter requires approval by property owner arborist.

Zone 3 Tree Protection Zone to Pavement Edge

No mechanical digging. Severing roots greater than 2 inches in diameter requires approval by the City Arborist.

Zone 4 Pavement Edge

Severing roots greater than 2 inches in diameter requires approval by the City Arborist.

Zone 5 Roadway

No Restrictions

7-3.10 Restriction Zones for Excavation, Trenching or Boring within a Tree Drip line behind Sidewalk and Rolled Curb

Zone 1

City Owned Tree City owned tree is usually within 5 feet from the back of sidewalk. Severing roots greater than 1 inch in diameter requires approval from the City Arborist.

Zone 2 Sidewalk

Severing roots greater than 2 inches in diameter requires approval from the City Arborist.

Zone 5 Roadway

No Restrictions

7-3.11 Tunneling & Directional Drilling

If trenching or pipe installation has been approved within the TPZ, then the trench shall be either cut by hand, air-spade, hydraulic excavation or, by mechanically boring the tunnel under the roots with a horizontal directional drill and hydraulic or pneumatic air excavation technology. In all cases, install the utility pipe immediately, backfill with soil and soak within the same day. Installation of private utility improvements shall be tunnel bored beneath the tree and roots per Table 1 - Trenching Distance and Table 2 – Depth of Tunneling.

Table 1 – Trenching Distance

Tree Diameter at 4.5 feet above adjacent ground	Trenching replaced with boring at this minimum distance (10 times tree diameter) from the trunk of the tree in any direction
6 – 9 inches measured at 6 inches	6 – 9 feet
10 – 14 inches measured at 54 inches	10 – 14 feet
15 – 19 inches measured at 54 inches	15 – 19 feet
Over 19 inches measured at 54 inches	20 feet

Table 2 – Depth of Tunneling

Tree Diameter	Depth of tunneling
9 inches or less measured at 6 inches	2.5 feet
10 – 14 inches measured at 54 inches	3.0 feet
15 – 19 inches measured at 54 inches	3.5 feet
More than 19 inches measured at 54 inches	4.0 feet

7-3.12 Street Trees

Exclusions for street trees in the publicly owned right-of-way (ROW).

1. Street Trees that are in conflict with utility infrastructure where the conflict cannot be resolved may be removed if approved by the City Engineer (e.g., a tree planted directly on top of a damaged sewer lateral.)

2. Emergency utility repairs shall be exempt from the above restriction zones within the TPZ. The City Arborist shall be contacted after any such repairs that may result in significant tree damage or removal.

7-3.13 Injury Mitigation

A mitigation program is required if the approved development will cause drought stress, dust accumulation or soil compaction to trees that are to be saved. To help reduce impact injury, one or more of the following mitigation measures shall be implemented and supervised by the project arborist as follows:

1. Irrigation Program. Irrigate to wet the soil within the TPZ to a depth of 24-inches to 30-inches. Or, apply sub-surface irrigation at regular specified intervals by injecting on approximate 3-foot centers, 10gallons of water per inch trunk diameter within the TPZ. Duration shall be until project completion or monthly until seasonal rainfall totals at least 8-inches of rain, unless specified otherwise by the project arborist.

2. Dust Control Program. During periods of extended drought, wind or grading, spray wash trunk, limbs and foliage to remove accumulated construction dust.

3. Soil Compaction Damage. Compaction of the soil is the largest killer of trees on construction sites due to suffocation of roots and ensuing decline of tree health. If a compaction event to the upper 12-inch soil horizon within the tree protection zone has or will occur by any means, then one or more of the of the following mitigation measures shall be implemented.

    A. Type I Mitigation. If an approved paving, hardscape or other compromising material encroaches within the TPZ, an aeration system shall be designed by the project arborist and used within this area (subject to approval by the City Arborist).

    B. Type II Mitigation. If inadvertent compaction of the soil has occurred within the TPZ, the soil shall be loosened by one or more of the following methods to promote favorable root conditions: vertical mulching, soil fracturing, core-venting, radial trenching or other method approved by the City Arborist.

    C. Type III Mitigation. For City-owned improvements in the right-of-way, areas within the TPZ that will be improved (e.g., asphalt, concrete or pavement) soil shall be compacted to 95% proctor density. Unimproved areas (e.g., grass, open landscape strip, etc.) soil in the TPZ shall not exceed 85% by water jet compaction.

7-3.14 Damage to Trees

A. Reporting

Any damage or injury to trees shall be reported within 6-hours to the project arborist and job superintendent or City Arborist so that mitigation can take place. All mechanical or chemical injury to branches, trunk or to roots over 2-inches in diameter shall be reported in the monthly inspection report. In the event of injury, the following mitigation and damage control measures shall apply:

1. Root injury: If trenches are cut and tree roots 2-inches or larger are encountered they must be cleanly cut back to a sound wood lateral root. The end of the root shall be covered with either a plastic bag and secured with tape or rubber band, or be coated with latex paint. All exposed root areas within the TPZ shall be backfilled or covered within one hour. Exposed roots may be kept from drying out by temporarily covering the roots and draping layered burlap or carpeting over the upper 3-feet of trench walls. The materials must be kept wet until backfilled to reduce evaporation from the trench walls.

2. Bark or trunk wounding: Current bark tracing and treatment methods shall be performed by a qualified tree care specialist within two days.

3. Scaffold branch or leaf canopy injury: Remove broken or torn branches back to an appropriate branch capable of resuming terminal growth within five days. If leaves are heat scorched from equipment exhaust pipes, consult the project arborist within 6 hours.

B. Penalty for Damage to Street Trees

In the event that street trees or their roots have been damaged, the contractor or property owner shall be subject to the penalty rate of $100.00 per inch of damage. Measurement of the damage shall be the width of the wound measured across the grain at the widest point. The Penalty fee shall be paid to the City and deposited to the general fund as required.

7-3.15 Inspection Schedule

The project arborist or Landscape Architect retained by the applicant shall conduct the following required inspections of construction sites containing protected and designated trees. Inspections shall verify that the type of tree protection and/or plantings are consistent with the standards outlined within these specifications and the project conditions of approval. For each required inspection or meeting, a written summary of the changing tree related conditions, actions taken, and condition of trees shall be provided to the City of Ceres. Monthly Inspection Reports shall be provided to the City Engineer.

INSPECTION SCHEDULE

A. Inspection of Protective Tree Fencing

The City Arborist shall be in receipt of a written statement from the applicant or project arborist verifying that he has conducted a field inspection of the trees and that the protective tree fencing is in place prior to issuance of a demolition, grading, or building permit, unless otherwise approved.

B. Pre-Construction Meeting

Prior to commencement of construction, the applicant or contractor shall conduct a pre-construction meeting to discuss tree protection with the job site superintendent, grading equipment operators, project arborist, City Arborist, and, if a city maintained irrigation system exists, the City Parks and Grounds Manager.

C. Inspection of Rough Grading

The project arborist shall perform an inspection during the course of rough grading adjacent to the TPZ to ensure trees will not be injured by compaction, cut or fill, drainage and trenching, and if required, inspect aeration systems, tree wells, drains and special paving. The contractor shall provide the project arborist at least 48 hours (2 working days) advance notice of such activity.

D. Monthly Inspections

The project arborist shall perform monthly inspections to monitor changing conditions and tree health. The City Arborist shall be in receipt of an inspection summary during the first week of each calendar month or, immediately if there are any changes to the approved plans or protection measures.

E. Special activity within the Tree Protection Zone

Work in this area (TPZ) requires the direct onsite supervision of the project arborist.

F. Landscape Architect Inspection

For discretionary development projects, prior to temporary or final occupancy the applicant or contractor shall call for the Landscape Architect to perform an on site inspection of all plant stock, quality of the materials and planting and that the irrigation is functioning consistent with the approved construction plans. The City shall be in receipt of written verification of Landscape
Architect approval prior to scheduling the final inspection, unless otherwise approved.

End Inspection Schedule

7-3.16 Pavement and Hardscape Conflicts with Tree Roots

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks or curbs (hardscape). Improper or careless extraction of the these elements can cause severe injury to the roots and instability or even death of the trees. The following alternatives must first be considered before root pruning within the TPZ of a Regulated Tree.

7-3.17 Removal and Replacement of Pavement or Sidewalk

A. Required Practices

Removal of existing pavement over tree roots shall include the following precautions: Break hardscape into manageable pieces with a jackhammer or pick and hand load the pieces onto a loader. The loader must remain on undisturbed pavement or off exposed roots. Do not remove base rock that has been exploited by established absorbing roots. Apply untreated wood chips over the exposed area within one hour, then wet the chips and base rock and keep moist until overlay surface is applied.

Replacement of pavement or sidewalk: An alternative to the severance of roots greater than 2- inches in diameter should be considered before cutting roots. If an alternative is not feasible remove the sidewalk, grind roots only as approved by the City Engineer and replace sidewalk using #4 dowels at the expansion joint if within 10-feet of a street tree. Use a wire mesh reinforcement within if within 10-feet of the trunk of a protected or street tree.

B. Alternative methods to prevent root cutting

The following remedies should be considered before cutting tree roots that Practices may result in tree instability or decline:

Grinding a raised sidewalk edge.

Ramping the walking surface over the roots or lifted slab with pliable paving.

Routing the sidewalk around the tree roots.

Install flexible paving or rubberized sections.

On private property, new sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are: permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, porches elevated on posts and brick or flagstone walkways on sand foundations.

C. Conflicts

Conflicts and associated costs can be avoided or reduced by the following planting practices:

1. Plant deep rooted trees that are proven to be non-invasive.

2. Over soil that shrinks and swells, install a sidewalk with higher strength that has wire mesh and/or expansion slip joint dowel reinforcement.

3. Follow soil loosening planting techniques to promote deep rooting.

4. Install root barrier only along the hardscape area of the tree (but allow roots to use open lawn or planter strip areas).

5. Dedicate at least 10-linear feet of planting space for the growth of each tree.

D. Alternative Base Course Materials

When designing hardscape areas near trees, the project architect or engineer should consider the use of recommended base course material such as an engineered structural soil mix. The approved structural soil mix will allow a long term cost effective tree and infrastructure compatibility that is particularly suited for the following types development projects: repair or replacement of sidewalk greater than 40-feet in length; subdivisions with new street tree plantings; planting areas that are designed over structures or parking garages; confined parking lot medians and islands or other specialized conditions as warranted.

7-4.00 REMOVAL, REPLACEMENT AND PLANTING OF TREES

7-4.01 Introduction

A regulated tree may not be removed without City review and approval, except in certain emergencies. The purpose of City review is to verify that the removal is allowed under City law, and to prevent unnecessary tree removal. In some cases, a removed tree must be replaced by the property owner or, in the case of street trees, developer. This section describes the type and size of tree required, and the planting techniques to be used. It also describes how to determine the replacement value of a tree that cannot be replaced in its original location, and the circumstances in which the City may require a security deposit to assure the survival of trees during development projects.

7-4.02 Allowable Tree Removal

A written permit is required to remove a Regulated Tree, except in emergency situations. Removal of Regulated Trees is allowed if:

A. A Protected Tree is determined to be dead, hazardous, a detriment to or crowding an adjacent protected tree, or is a Public Nuisance.

B. A protected tree trunk is touching or the basal flare is under the building footprint of an existing building (for example, uplifting foundation, contact or damage to eaves, gutter, etc.).

C. On projects other than a single family residence, a Protected Tree may be removed if it reduces the otherwise-permissible building area by more than 25%.

In the case of street trees, Public Works Operations issues a written approval. In the case of a Designated Tree shown on previously approved site or landscape plans, the Director approves the removal in writing.

7-4.03 Permit Application

Tree Removal Applications are available at the City of Ceres Community Development Department, 2220 Magnolia Street, Ceres, California 95307.

The following is a checklist of items necessary for City review for tree removal. Additional information may be required by the reviewing staff. Response will generally be mailed to the applicant within 10 days. The removal permit must be on site during the removal.

7-4.04 Tree Removal Checklist

Completed City of Ceres Tree Removal Permit.

Payment of permit fees.

Letter from a certified arborist on company letterhead to include the following information for each tree:

A written narrative describing the tree species (common and scientific); location (in relation to street, structures and property line); size (DBH, height & crown spread); condition (foliage, vigor, structural integrity, etc.); life expectancy and prognosis (is the tree hazardous, severe decline, property damage, etc.)

7-4.05 Hazard Trees

To remove a protected or designated tree that has been verified as hazardous written approval from the City Arborist is required and must be available on site when the tree is being removed, unless emergency conditions exit.

7-4.06 When Tree Replacement is Required

A. Replacement Trees

Certain conditions determine whether or not a protected or designated tree must be replaced. In summary, they are:

1. Protected Trees

If the City authorizes removal of a protected tree because it is dead, dangerous, or a nuisance, no tree replacement is required. In all other cases, the tree must be replaced.

2. Designated Trees

When authorizing removal of a Designated Tree, the Director or the Director's designee shall require tree replacement if it is necessary or desirable to implement the intent of the original site design. The number and nature of the replacement trees shall be determined by the Director or designee, taking into consideration the value of the tree removed and the site design.

3. Street Trees

If the City authorizes removal of a street tree in connection with a development project, it shall specify the replacement requirements in the permit authorizing removal.

B. Alternatives When Trees Cannot be Replaced on Site

In some circumstances, crowding or other physical constraints make it impossible or undesirable to replace a tree of equal value in the same place. In that case, the value of the tree shall be computed under the Tree Value Replacement Standard in this specification. Once the value has been determined, that sum of money shall be used in the following order of preference, as approved by the Director:

1. to provide additional trees elsewhere on the site

2. to add or replace street trees or other public landscaping in the vicinity

3. to add trees or other landscaping to other City property.

C. Tree Canopy Replacement Standard for Onsite Tree Replacement

When a Protected or Designated Tree is to be replaced on site, the following standards apply.

1. Species

The replacement trees shall be the same species unless the Director determines that another species would be more suitable for the location. Factors to be considered include the long term health of the tree in the location and its compatibility with the adjacent uses as well as design considerations.

2. Location

The location of the replacement tree on site shall be approved by the Director. If it is not possible or desirable to replace the tree on site.

3. Size and Number

Often it is not possible to replace a large, older tree with a single equivalent tree. In such cases, the following tree canopy replacement ratio shall be used:

Table 3 – Tree Canopy Replacement Standard

Column 1	Column 2	Column 3
Canopy of the Removed Tree (Average distance across the canopy)	Replacement Trees	Alternative Tree
4 – 9 feet	Two 24 inch box size	One 36 inch box size
10 – 27 feet	Three 24 inch box size	Two 36 inch box size
28 – 40 feet	Four 24 inch box size	Two 48 inch box size
41 – 56 feet	Six 24 inch box size	Two 48 inch box size and Two 36 inch box size
56 – 60 feet	Two 24 inch box size and Two 36 inch box size and Two 48 inch box size	* *
> 60 feet	* *	* *

* Add half of the difference between the two to the narrowest measurement for the average canopy.
* * Replace the tree with a combination of both Tree Canopy and Tree Value Standards.

Note: Basis of this table is determined by the growth of one 24 inch box size tree, growing at a rate equivalent to 9 feet of canopy over ten years.

How to use Table 3 - Tree Canopy Replacement Table.

Column 1. Determine the leaf canopy of the removed tree by measuring the distance across the canopy at the widest point and narrowest point. Add half of the difference between the two to the narrowest measurement for the average canopy. The leaf canopy diameter of the tree (this information is typically supplied within the arborist report) is used to determine number and size of replacement trees in Column 2.

Column 2. Determine the number of replacement trees. The planting of new trees should equal the leaf canopy of the removed tree within a period of ten years. The minimum replacement for removal of any Protected or Designated Tree shall be two 24-inch box trees.

Column 3. Alternative size of trees may be desired. The property owner shall have the option to plant an alternative size tree to accommodate site specific landscape needs or constraints, such as space, design or soil volume limitations.

Example of Tree Canopy Replacement Ratio:

The removal of a tree with a 39 feet crown spread will require four 24 inch box trees to satisfy the criteria of this specification.

The average canopy of a new tree is 4 feet wide plus the expected canopy growth of 6 inches per year x 10 years = a 9 feet net canopy of one replacement tree. Thus, four 9 feet trees = 36 feet of new canopy, and is a close approximate to the original 39 feet canopy tree.

D. Tree Value Replacement Standard

When the value of a tree needs to be determined for establishing the amount of security required, or for any other purpose, the value shall be determined by using the most recent edition of the Guide for Plant Appraisal published by the Council of Tree and Landscape Appraisers.

7-4.07 Security Deposits

As a condition of a development approval, the Director may require that the developer post security of between 25% and 100% of the value of the trees to be preserved, as determined in these specifications. The security may be a cash deposit, letter of credit, or surety bond and shall be filed with the Finance Department. It shall be in a form satisfactory to the City Attorney. The security shall be posted before issuance of any grading or building permits. The guarantee period shall be specified; in general, it shall be at least two years after expected completion of construction. If the trees fail to survive, the developer shall replace them; if the developer fails to do so, the City may use the security to provide off site trees and/or landscaping as described in Section

7-4.08 Tree and Shrub Planting Specifications

Planting specifications apply for trees and shrubs that are:

1 planted as a replacement for a Regulated Tree
2 to be planted as a street tree within the City right-of-way or other public land
3 planted as part of a landscape plan subject to non-residential development approval.

Using the following specifications will result in consistent city-wide plantings, and superior tree growth and vitality. To achieve this, the landscape architect shall incorporate these items into their specifications.

7-4.09 Planting Stock and Materials

A. Quality

The contractor has the responsibility to supply stock that meets ANSI 760.1-1996 and City of Ceres standards and specifications. All plants and trees installed within the City of Ceres shall conform to the American Association of Standards, ANSI Z60.1, Specifications for Acceptance of Nursery Trees at the Time of Delivery, in all ways.

Plants shall be sound, healthy, vigorous, and free of plant disease and insect pests and their eggs.

Container stock shall be grown for at least 8-months in containers in which delivered and shall not be root bound or have girdling roots.

Trees shall not have been topped or headed.

Landscape Architect shall inspect and verify, in writing, that all plant material to be installed on the site meets the above standards and is acceptable.

The written verification shall be forwarded to the City Planning Department files within one week of acceptance.

Inspection shall occur after delivery of stock to the project site.

Plants and trees with broken tops, branches or injured trunks shall be rejected.

B. Miscellaneous Materials

The following materials shall be used unless otherwise specified:

1. Tree Stakes: Support stakes shall be treated 2-inch diameter Lodge pole Pine, two stakes per tree or approved equivalent. No cross brace shall be used. After installation, stakes shall be trimmed so that the branches clear the top of the stake.

2. Tree Ties: 'V.I.T' Tree Supports (recommended) or equivalent, twist brace, fabric-reinforced rubber (3/8-inch minimum), or equivalent approved by the City of Palo Alto shall be used and installed in a figure eight fashion to support the tree to the stakes.

3. Mulch: Screened untreated wood chips 1/2- to 1-inch in size, spread to a 2-inch depth out to the edge of the root ball. The mulch should be kept at least two inches away from the trunk and shall be applied to each.

4. Root Control Barriers: Use along all public sidewalks, and indicate on approved plans and drawings. 18-inch Linear Barrier LB18-2 root control barrier shall be used. Unless specified otherwise, a 10-foot length shall be placed on center with the tree and on the sidewalk side only. Root barrier boxes are not approved.

5. Mower Guards: For trees in turf areas requiring regular mowing, the tree stem shall be protected with TreeGuard or equivalent.

6. Tree Grates: Where sidewalk width is less than 8-feet and new trees will be installed in a tree well, metal tree grates shall be used and approved by Public Works. Minimum size grates shall be 4 feet by 4 feet unless specified otherwise. All tree grates shall be mounted in frames, frames inset into a concrete foundation within the sidewalk or surface material and shall be flush with the surrounding surface.

7-4.10 Planting Site Preparation

A. Soil Preparation and Conditioning

All debris, wood chips, pavement, concrete and rocks over 2inches in diameter shall be removed from the planting pit to a minimum of 24-inch depth, unless specified otherwise.

B. Planter Pit

Trees in a confined planter pit or sidewalk area: The planting hole shall be excavated to a minimum of 30-inches deep by the width of the exposed area. Scarify the sides of the pit. Soil beneath the root ball shall be compacted to prevent settling.

C. Trees in all other areas

Excavate the hole's width a minimum of three times the diameter of the container, and deep enough to allow the root ball of the container to rest on firm soil. Scarify the sides and the bottom of the pit. The height of the container root ball should be 1-2-inches higher than grade level, except when structural urban tree soil mix is used, in which case the tree may be planted at level grade.

7-4.11 Drainage

A. Poor drainage

For discretionary development projects, a percolation test is required to ensure there is adequate drainage for planting new trees. A minimum of one test per site shall be reviewed with the project arborist or Landscape Architect prior to plant installation. One or more of the following mitigations are required for locations with poor drainage.

B. Mitigation for locations with poor drainage

Install trench drain. The trench shall radiate away from the tree and be a minimum of 18-inches in depth filled with drain rock. The grade shall fall away from the tree trunk.

Install drain tiles or perforated pipe directing water away from the tree.

Install a drain chimney at the bottom of the planting pit, a minimum of 4-inches in diameter and filled with medium sand or fine gravel to ensure percolation of all water from the filled planter pit. Auger bore drain holes to penetrate hard pan a minimum of 12-inches into undisturbed pervious soil. Angle the boring as close to vertical as possible.

C. Planting Percolation Test

A minimum of one test per development site is required. Additional tests may be needed as required by Landscape Architect or City Arborist. Fill planting hole with water, provide drainage that is greater than 2-inches per hour. If percolation is less, one or more of the following mitigation measures must be implemented for trees.

D. Aeration tubes for trees

Street trees planted in the City right-of-way, sidewalk planter pits, planting strip, medians or designated trees when specifically required in development plans, shall use 4-inch diameter perforated aeration piping (rigid or flexible), circling the bottom of the planter connected to a 'T' fitting to two riser tubes with grated caps and wrapped with filter fabric. All other trees shall be planted with 4-inch diameter perforated aeration tubes with grated plastic caps placed at the edge of the root ball to the bottom of the pit per Table 4 - Aeration Tubes. Irrigation heads shall not be installed inside the aeration pipes. Any of the above holes, pipes, grates or fixtures shall include the
installation of Filter Fabric wrap over the side openings and secured as recommended by manufacturer when connected to an approved aeration system.

Table 4 – Aeration Tubes

Tree Size	Number of Tubes
15 gallon	1
24 inch box	2
36 inch box	2
48 inch box and larger	4, or as needed

7-4.12 Planting the Tree

A. Percolation Test

If the soil is dry, add a few inches of water in the hole. Let it drain before planting the tree.

B. Depth

To check the proper depth of the root ball, place the tree in the hole and lay a pole or shovel across the original grade - the top of the root ball should be 1 to 2-inches higher.

C. Container and Roots

Remove tree from the container and trim the root ball in the following way:

Thick circling roots: straighten and/or cut cleanly
Thin roots: make three to four vertical cuts 1/2-inch deep around root ball, spread the bottom out if necessary

D. Placing the Tree

Locate the tree in the hole, and rotate the tree to direct the main branches away from the street side, if possible.

E. Filling the Hole

Place the aeration tubes, fill the hole halfway up with original soil (amended soil only when approved), and gently tamp out air pockets with a pole or shovel handle. Add about 1-inch of water, and let drain. Fill the rest of the hole to grade, water the fill soil, and let drain.

F. Staking

Place the stakes at the edge of the root ball (drive them 2-feet into undisturbed ground), and avoid contact with the branches. If in a windy area, set the stakes in a plane at right angles to the wind. Remove the nursery stake. Loosely place two ties in a figure eight around the trunk, as low as needed to hold the tree upright and nail to the stake. Stakes shall be trimmed so that the branches clear the top of the stake. Do not install a cross-brace.

G. Berm, Mulch and Water

In non-turf areas, form a soil berm 3 to 4-inches high at the outermost edge of the root ball. Place 1 to 2-inches of mulch or bark over root ball and berm, keeping the mulch away from the trunk a minimum of 2-inches. Fill the berm with water to capacity.

7-4.13 Planting in Difficult Soil Conditions

A. Turf Areas

In turf areas that receive regular watering, the watering berm may be eliminated. The turf shall be maintained a minimum of one foot from the new tree stem, and mulch placed on top of the root ball. The mulch shall not be touching the tree stem. In turf areas, install tree guards.

B. Alternate Specifications

Occasionally, tree planting must occur in poor or difficult soil where standard planting techniques will result in poor-to-average performance or mortality (such as unique or unusual regional geology, slope, soil volume, restrictive physical or chemical properties, poor drainage, etc.). In this case, the responsible party must investigate alternative solutions to enable long term tree growth. Alternative planting specifications or plans that vary from the native or typical soil conditions shall be submitted to the City Arborist for approval prior to installation.

Alternative or specified soils, such as engineered, amended or structural urban tree soil mix, including written specifications and physical samples, shall be submitted for approval from the City Arborist and/or Landscape Architect

7-5.00 HAZARDOUS TREES

7-5.01 Introduction

Property owners are responsible for the trees on their own property. The City does not require advance permission for removal of Protected or Designated Trees in emergencies. However, it does require documentation of the problem after the fact. This is to avoid the unlawful removal of sound trees on the grounds that they are hazardous. If there is no immediate danger, and the structural deficiency can be corrected, it should be. If the City determines that there was no reasonable basis for believing there was an emergency, the property owner may face penalties for violating City law.

The health and safety of a tree are two distinct and separate functional characteristics. A vigorous and healthy tree may not necessarily be of sound wood or structure. To remove a dangerous protected or designated tree, it must first be evaluated and the tree determined to be "hazardous" as defined in this section. This must be verified in writing by the City Arborist before the tree can be removed.

7-5.02 Tree Hazard Responsibility

On private property, it is the responsibility of the property owner to mitigate or abate a known hazardous condition of a protected or designated tree that may be of questionable structure or deemed as hazardous. Most tree hazards can be prevented with regular checkups by a tree care professional and timely maintenance action by the property owner. Street trees on city property that may be a public safety hazard should be reported to the City Engineer.

7-5.03 Recognizing Tree Hazards

Determining whether or not a tree's defects constitute a condition that presents an imminent hazard to an area requires a high degree of knowledge and experience. Hazard tree assessment of a protected or designated tree should only be evaluated by an arborist who is familiar with tree physiology and can interpret the external signs of weaknesses.

7-5.04 Emergency Removal Conditions

A. Abatement

When a tree has partially failed or it is apparent it is about to fail and persons or property are threatened the tree may be removed without City review or approval. The City does not require an arborist report before the removal in this instance.

B. Authorization

Such cases must be substantiated after the fact by the property owner and tree professional with photographs, abatement information, insurance claim or other relevant information and completion of a Protected Tree Removal

C. Application

The information is to be submitted to the Community Development Department within five days of emergency removal. All other authorizations are subject to the standard procedure outlined in Removal of Protected Trees.

7-5.05 Criteria Used by the City to Determine if a Tree is Hazardous

A. Definition of Hazardous An imminent hazard or threat to the safety of persons or property. If a tree possesses a structural defect that may cause the tree or part of the tree to fall on someone or something of value, and the condition is determined to be imminent, the tree is considered hazardous.

B. Evaluation Form

The City uses the national standard, an ISA - HAZARD EVALUATION FORM as a basis to determine the hazard rating of a tree. This form, or an approved equivalent, must be completed by a certified arborist. The City Arborist retains discretionary right to approve, request in writing a second opinion of a rating, in writing, or recommend action that may reduce the condition to a less-than significant level of hazard.

C. Authorization

If the hazardous condition or target cannot be mitigated or reduced to a less than significant level then the tree shall be authorized by the City and removed by the property owner to abate the condition.

D. Determining a Tree's Hazard Rating

For the purpose of removal, if a tree is declared a hazard it must be rated for the level of hazard to persons or property by using the Hazard Rating Formula, or other professional methodology acceptable to the City.

Table 5 – Hazard Rating Formula

ISA – HAZARD RATING FORMULA International Society of Arboriculture			
Failure Potential	+ Target	+ Additional factors / size of part	= Hazard Rating
	+	+	=
1= low 4 = severe	1 = low 4 = severe	1 = low 4 = severe	3 = low 12 = severe

Note: The above factors are combined to quantify a hazard rating. For example, a minimum rating of 3 is the safest (a low predicable hazard), and the maximum rating of 12 is an imminent hazard (a high predictable hazard). Further details regarding this formula can be found in the ISA- HAZARD EVALUATION FORM and the ISA publication Evaluation of Hazard Trees in Urban Areas, most current edition.

E. Failure Potential Rating

Failures do not occur at random, but are the result of a combination of defects and aggravating conditions. The scope of the professional evaluation will include structural defects in the tree (including branches, trunk and roots; and if necessary, shall employ the use of the most current methods of internal decay inspection available); soil/slope and/or creek bank stability; individual species susceptibility to failure; pruning; history; decay weaknesses and any other compromising or pertinent factors considered by the consultant.

F. Target Rating

Evaluation of potential targets shall include people, structures or property use and occupancy that are imminently threatened. Property use shall consider what structures or activities are under or around the tree (e.g. building, parking, pedestrian, recreational, utility lines, hardscape, etc.). Occupancy shall consider frequency of the use (occasional, intermittent, frequent or constant), and whether the target will be present when failure occurs.

Consideration shall be given as to whether the target can be reasonably removed or isolated to reduce the hazard rating to a less than significant level. A target means people or property (public or private).

A tree may be a potential hazard if it is: (a) a tree with the potential to fail; (b) in an environment that increases the likelihood of failure and; (c) a tree that would strike a target.

G. Additional Factors

Evaluation of other factors that contribute to aggravating conditions shall be considered, such as: size of the affected defect (i.e. a small branch vs. the entire tree uprooting); significant potential of fire, utility line contact or catastrophic effects, etc.)

7-5.06 Tree Evaluation Checklist

This part is intended to further help the property owner understand tree defects and how they may be interpreted by an arborist. Many tree defects are not readily apparent because decay or structural damage may be internal. Also, poor tree health may not reflect poor tree structure. Hazardous trees must be carefully evaluated. The following checklist of criteria that is typically used by professionals may indicate potential or current tree hazards. The checklist is not meant to be a comprehensive guide, however, it is an outline of indicators that may alert a property owner to potential hazards and suggest action to avert a tree failure and liability. If you answer ‘yes’ to one or more of the checklist items, you should contact an arborist to discuss how to reduce the potential hazard.

A. Hazard Evaluation Questionnaire

1. Target: If the tree or branch falls will it hit cars, houses, structures, power lines or people?

2. Dead Branches: Are there dead tops or branches? Is the tree dead?

3. Cracks: Are there deep, open cracks in the trunk or branches?

4. Crotch Cracks: Are there deep, open cracks below joining trunks or stems?

5. Tree Architecture: Has the tree grown beyond its species specific shape into a hazardous form? Is the tree leaning?

6. History: Has the tree recently lost large branches?

7. Edge Tree: Were neighboring trees recently removed, leaving tall trees exposed at the edge that may be subject to unexpected wind dynamics and blow-over?

8. Living Branches: Do live branches bend abruptly upward or downward where tips of large branches were cut off? These may pull out of trunks that are weakened by rot or cracks. Beware of large branches on rotten or cracked trunks.

9. Topping: Are large branches growing rapidly from topping cuts? These sprouts have weak attachments and may weaken further as they grow. Is there decay below topping cuts?

10. Storm injury: Are there broken branches, split trunks, or injured roots? Are branches close to power lines?

11. Root Rot: Are there fungus fruit bodies (mushrooms) on roots or near the trunk? Were roots injured by construction?

12. Rots and Cankers: Are there hollows or cankers (dead spots) in the trunk or major branches, some with fungus fruit bodies?

13. Construction injury: Have roots, trunk, or branches been injured?

14. Is there a new lawn or garden over injured roots? The added fertilizer may stimulate the growth of fungi that will rot the supporting roots while the top gets heavier. A moderate storm could cause the tree to fall.

15. Guying of trees. Staking and guying of small to medium size trees may benefit from the additional support. Discretion must be exercised that the guying does not hide weaknesses, such as toppling over, that result from poor quality nursery stock or girdling roots.

7-5.07 Hazard Reduction and Prevention

Review the following list to reduce hazardous conditions.

Plant trees that are not problematic and that fit the site The International Society of Arboriculture (ISA) has developed a list to assist you to avoid planting a tree that may become a problem.
A healthy, vigorous tree that receives regular care is less likely to become hazardous than one that is ignored. Prevention is the best solution to the tree hazard problem.

The risk of a hazard tree may be reduced by removing dead and broken branches, reducing branch end weights, by mechanically supporting weak branches from below, or by cabling and bracing.

In some cases, targets may be removed such as by moving picnic tables or other items beneath a precarious tree, fencing to prevent access to such trees, or rerouting pedestrian or vehicular traffic.

If there are no other options to abate the hazard, the tree may need to be removed entirely. Steps outlined in the Tree Removal Procedure) should be submitted as soon as possible for review by the City.

The following checklist will help property owners avoid future problems:

- Inspect your trees carefully at least once each season every year. Annually, have a Certified Arborist inspect your trees and provide you with a written report.
- Avoid planting brittle species where falling limbs could injure people or property.
- Prune trees when they are young and regularly thereafter.
- Use correct pruning methods, always making the pruning cut outside the branch collar. This will allow only the minimum of decay infection.
- Do not allow topping.
- Always plant the right tree in the right place. Select trees based upon their mature height and shape, and make sure the species selected matches the soil and other site characteristics. For example, avoid planting tall-growing trees such as redwoods near power lines or too close to your house.
- Water thoroughly (generally, until saturation is reached) during dry periods, slowly applying at least 2 inches of water per week.
- Erect barriers around or slightly beyond the root protection zone of trees during construction. Insist that these root protection zones be honored by construction workers.
- Consider cabling or bracing weak forks of branches in larger trees of high value.
- Do not plant trees with a narrowly-forked stem v-crotch, imbedded bark or girdling root ball.
- Where a valuable specimen tree may be suspected of developing into a hazardous tree, use landscaping to keep people at a safe distance. This may require techniques such as rerouting walks, moving patio furniture, or planting shrubs and hedges to function as barriers to keep foot traffic at a safe distance.

7-6.00 TREE MAINTENANCE GUIDELINES

7-6.01 Introduction

This chapter establishes the minimum standard of care and maintenance of City Regulated Trees. These standards apply to all persons who own or are engaged in the business of repairing, maintaining, or preserving these trees. The following standards of care are set forth for pruning (including utility, fire and traffic encroachment), planting, watering, soil and nutrient requirements, insect, disease and fruit control. Guidelines for selecting an arborist are also given. These standards and guidelines are based on sound arboricultural principles and are applicable to trees, shrubs and woody plants.

7-6.02 Care of Regulated Trees

All owners of Regulated Trees are to follow the required maintenance standards set forth in this Manual. If special pruning or situations require a variance from these Standards, it is the responsibility of the project arborist and property owner to clarify why the changes are needed and review them with the City Arborist.

7-6.03 Prohibited Acts

The following permitted and prohibited maintenance practices for protected and designated trees apply.

A. Excessive Pruning

Except for clearance pruning of utility lines, traffic or abating a Public Nuisance, excessive pruning shall be considered a prohibited act.

B. Topping

Topping shall be considered a prohibited act Seek alternatives to topping.

C. Other prohibited actions

Taking any action leading to the death of a tree or permanent damage to its health, including but not limited to excessive pruning, cutting, girdling, poisoning, over watering, unauthorized relocation or transportation of a tree, or trenching, excavating, altering the grade, or paving within the drip line area of a tree.

7-6.04 Standards for Pruning Regulated Trees

The most compelling reason to prune trees is to develop a strong, safe framework. All work to be performed on Regulated Trees shall be in accordance with the following standards.

A. Specifications

All specifications for working on protected and designated trees shall be written and shall be administered by a qualified arborist, and shall be designed to promote the preservation of tree structure and health.

B. Industry Standards

All work on Regulated Trees shall be in accordance with the most current edition of the following industry standards: (see. Standard Practices for Tree Care Operations - ANSI A300-1995 Appendix G; Safety Standards, ANSI Z133.1-1994, Appendix F).

7-6.05 Pruning Mature Trees

There are six types of pruning that may be required for use on mature Regulated Trees (see ISA Tree Pruning Guidelines, Appendix E). Prior to entering the tree, the tree worker is required to be familiar with these types of pruning as stated in the Performance Standards, ANSI, A300-1995. 'Species-specific' pruning promotes the natural shape of the tree (i.e.;, excurrent, decurrent, vase-shaped, fast growing, etc.).

1. Crown Cleaning
2. Crown Thinning
3. Crown Raising
4. Crown Restoration
5. Crown Reduction
6. Utility Pruning

A. Tree Injury

Climbing and pruning practices shall not injure the tree except for the pruning cuts.

B. Timing of Pruning

To reduce the probability of insect infestation, disease or infection, the following seasonal restrictions apply, except when public safety is a concern:

1. Pine (Pinus spp.) or Elm (Ulmus spp.): Do not prune May-October

2. All species: Do not prune during the flush of spring shoot growth

3. Trees with thin bark: Do not prune in summer when sun scald injury may be a factor

4. Deciduous trees (leafless in winter): Best pruned November - February

5. Hazardous trees of any species may be pruned any time of the year for abatement reasons

C. Pruning Distressed Trees

Distressed trees require as much leaf area as possible to overcome stressed conditions. To avoid additional injury, the following measures shall be followed for these trees.

D. Injury or Disturbance

If a tree has been damaged by injury or disturbance, delay pruning until deadwood becomes evident (typically 1-3 years after injury). Crown cleaning is then recommended.

E. Neglect

Trees that have received little or no care or maintenance may need moderate crown thinning, reduction of end weights or entire crown restoration.

7-6.06 Pruning Young Trees

The average life expectancy for trees growing in harsh urban conditions is 7-10 years.

By pruning trees early, it will improve life expectancy and is a proven, cost-effective measure. Added benefits are also reflected in safer trees with fewer branch failures. For trees that serve as a replacement for a protected or designated trees, they shall be pruned in the following way:

Young trees should be pruned during the second year after planting to improve their structure, and only minor crown cleaning every 3-7 years thereafter. Refer to ISA Tree Pruning Guidelines.

Do not top the main leader except to position the lowest main branch. Other main branches should be spaced at least 18-inches apart to alleviate a tight grouping branches.

Select permanent branching and allow temporary low branching on the lowest part of the trunk to remain.

7-6.07 Fertilizing Standards

This section outlines performance standards for fertilizing and apply only if fertilizing is specified. Fertilizing mature trees is generally not necessary. Fertilizing may be specified for trees that will be impacted by upcoming disturbance, grade changes or a modified environment. Benefits gained from the increase stored resources may aid the tree to overcome the stress caused by disturbance.

A. Specifications

Fertilizing, if specified, shall be performed to the following standards:

Method of application The method shall be subsurface injection, on approximate 3-foot centers (within the root ball on young trees; 2-feet out on older trees) and out to the approximate drip line perimeter. Specific situations may justify other variations such as vertical mulch, soil-fracture or surface-broadcast methods.

Material and Rates Unless specified otherwise, fertilizer formula shall be a slow-release, complete fertilizer with chelate trace elements (e.g. 22-14-14 or 20-20-20) and mixed at label rates not to exceed 4-pounds nitrogen per 100-gallons of water. Extraordinary cases may require soil and tissue sampling to correct target deficiencies.

Amount Unless specified otherwise, volume shall be determined by mixing 10-gallons of water per inch of trunk diameter when measured at 54-inches above natural grade.

Timing Timing should not be detrimental to tree health. Best results are derived from applications made during the prior growing season. Apply fertilizer between May through September for best results.

7-6.08 Watering Schedule

Newly installed trees planted, including drought tolerant species, are dependent upon supplemental irrigation until established, typically for two years. Periods of extreme heat, wind or drought may require more or less water than recommended in these specifications. The method and amount that is applied may vary depending upon soil composition, heat, wind, planted in turf or ground cover, periods of abnormal rainfall or in poorly drained soils. The watering of protected or designated trees or their replacements shall follow these standards:

A. New trees

During the establishment period (1-2 years) trees should be watered thoroughly to their root depth as frequently as needed. A watering schedule is to be submitted at the preconstruction meeting. The schedule is to include watering frequency and quantity. The minimum standards shall be as follows:

1-3 months in the ground: 4 times per month or as necessary
4-6 months in the ground: 2 times per month or as necessary
7-12 months in the ground: 1 time per month or as necessary

B. Mature trees

Most species: 1 time per month during irrigation season (usually March through September)

C. Watering Methods

The following options shall fulfill the watering requirements. One or more of the following may be utilized dependent upon unique circumstances subject to the City Arborist determination. The options are as follows:

Automated Watering Systems

All new street trees planted within the right of way and designated trees shall be provided with one of the following automatic watering systems.

1. Bubbler heads

One or two bubbler heads mounted on flexible tubing are to be placed adjacent to or on top of the root ball. The placement of bubbler within an aeration tube is not allowed.

2. Drip Loop system

A continuous loop of drip tubing circling around the trunk at a point two-thirds out from the trunk to the edge of the root ball (for new trees 36-inch box size and greater, a second loop of drip tubing is required at a point just beyond the root ball on native soil).

Hand watering systems

Recommended for trees that are part of a development project that must be watered to insure tree survival during the course of construction until automatic irrigation is installed.

Flood watering

Newly installed trees must be 'flood or basin-watered' on top of the root ball to allow the water to infiltrate through the root zone.

Subsurface injections using a hydraulic spray pump (practical for use in hard, compacted soils or steep hillsides).

Soaker hose. Slow, deep watering using a garden type soaker hose.

Wetting agent

A root ball that has been allowed to dry out beyond the wilting point shall require the addition of a wetting agent to the water (such as Aqua-grow or equivalent).

Amount

Unless otherwise specified, the volume of water applied at each irrigation should be in the range of 10-gallons per inch of trunk diameter when measured at 54-inches above natural grade. The final decision of whether to water or not should be based on accurate soil probe samples that are taken from the root ball.

7-6.09 Soil Improvement

During development, compaction of the soil is the largest single factor responsible for the decline of oaks and older trees. Ninety percent of the damage to the upper eighteen inches of soil occurs during the first pass of heavy equipment - and cannot be reversed. Every effort to avoid compaction of soil porosity within the tree protection zone shall be taken at all times. When required by the conditions of Discretionary Development Approval for a project or as mitigation for injury or a prohibited action, the following performance standards for improvement of compacted or damaged soil shall be implemented:

A. Aeration

Soil that is damaged or compacted within the drip line of protected or designated trees shall be loosened or aerated to promote root growth and enhance tree vitality. One of the following aeration methods shall be specified an in effort to correct compacted soil conditions:

1. Vertical Mulching: auger holes 2 to 4-inch diameter, 2 to 3-feet deep, on 4-foot centers and backfilled with porous material such as perlite, vermiculite or volcanic rock

2. Radial Trenching: with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the drip line area. The trenches shall radiate out from one foot apart at the closest point.

3. Soil-fracturing with a pneumatic air-driven device

4. Subsurface injections under moderate hydraulic pressure using a three foot probe and applied on 3-foot centers under the drip line.

B. Drainage

Adequate drainage must be provided to the surrounding soil for the planting of new trees. If the trees are to be planted in impermeable or infertile soil, and water infiltration rates are less than 2-inches an hour, then one of the following drainage systems or other approved measures must be:

1. Trench drain, a minimum of three feet in depth
2. Drain tiles or lines beneath the trees

3. Auger six drain holes at the bottom perimeter of the planting pit, a minimum of 4-inches in diameter, 24-inches deep and filled with medium sand or fine gravel

7-6.10 Insect and Disease Control

Generally, insect populations do not threaten tree health to the point of mortality. More often, when their populations become too great they create a nuisance. For example, scale on tulips or aphids feeding on purple leaf plums produce sticky honeydew that may be a nuisance if dripping on cars or at a storefront entry. Occasionally, however, pests such as Oak or Tussock Moth larvae can defoliate and severely damage a tree.

If action is warranted, Integrated Pest Management (I.P.M.) suggests that the pest source be identified and targeted with a specific and timely treatment. If insects or disease can lead to the death of a protected or designated tree, then it is the responsibility of the property owner to evaluate the condition according to the following guidelines and treat the problem in a timely fashion to prevent further deterioration of the tree.

A. Insects

For treatment, consult a pest control operator that is licensed by the California Department of Pesticide Regulation. Accurate timing is critical for success. Nontoxic materials should be used whenever possible to control leaf-chewing insects

B. Disease and Decay - above ground

Disease such as heart-rot decay that erodes the health or weakens the structure of a protected or designated tree may compromise the safety of people or property. The property owner has the responsibility to correct a known hazardous condition in a timely fashion.

Consult with a certified arborist for remedy possibilities, for example, pruning out infected branches, thinning, or the spray application of a chemical treatment.

C. Disease - below ground

Soilborne diseases, such as Oak Root Fungus (Armillaria mellea) or Root Rot (Phytophthora sp.), are present in Palo Alto soils. Often, a poor landscape design surrounding old trees encourages harmful, and often lethal diseases. The following conditions that favor a disease environment must be avoided.

Conditions to avoid: Compacting of the soil within the tree's dripline, adding fill dirt, rototilling, trenching, removing soil from the tree root area, and excessive or regular watering on or near the tree trunk area and planting incompatible water-loving plants within the tree's dripline. Combined with poorly-drained soil, these factors often activate normally dormant fungi to become opportunistic and infect the tree to cause the decline and eventual death of the tree. This decline can be slow and may not be evident for many years.

7-6.11 Landscape Design

When planning landscaping around a protected or designated tree, an evaluation of the tree and soil must be performed to determine if there is a disease present. If the tree is diseased and landscaping will contribute to decline, permanent damage or render it hazardous, it is the obligation of the property owner to take reasonable measures to reduce or eliminate the conditions that may cause the decline of the protected or designated tree.

To identify cultural conditions that may lead to diseases such as Oak Root Fungus, Verticillium, Phytophthora or other soilborne fungi, review the Sunset Western Garden Book or consult with a Certified Arborist. Use plants under oaks that have low to moderate water needs. Plants selected for use under an oak should not need water more than once a month. Use a drip system to irrigate around an oak so that runoff does not flood the area.

7-6.12 Foliar disease

Leaf spot or galls may be chronic or reoccur with specific seasons. Though many of these diseases destroy leaf tissue and become unsightly, they may not significantly reduce the trees health and therefore need not be treated.

7-6.13 Fruit Control

While all trees produce flowers or fruit of some kind, some trees can be considered a nuisance if the use area is not compatible with the litter generated by the tree. For example, the dropping fruit of the

European Olive (Olea europaea), American Sweet Gum (Liquidamber styraciflua), or acorn drip of a Holly Oak (Quercus ilex) may be a safety hazard if it is in the proximity of a handicap ramp or other high pedestrian area and will thus justify control measures. Control can only be successful if materials are applied carefully at optimum timing. For treatment to control the situation, consult a pest control operator that is licensed by the California Department of Pesticide
Regulation.

7-7.00 TREE REPORTS

7-7.01 Introduction

An arborist report is needed for development projects and tree removal permits. The report must be prepared by a certified arborist for the applicant and submitted to the City for the purpose of providing accurate information and opinion regarding the condition, welfare, maintenance, preservation or value of a protected or designated tree.

A. When a written report is required

Generally, there are two circumstances in which tree reports are required:

1. when a tree removal permit is sought

2. to complete and verify a site plan, assess tree impacts and establish tree protection for property development when within the drip line of a protected or designated tree.

B. Types of report formats are:

Letter Report, Tree Survey, Tree Protection and Preservation Plan and Tree Appraisal.

C. Who may prepare the report

The tree report is to be prepared by a certified arborist retained by the applicant or property owner. This person shall possess a current ISA certification; be a member of the American Society of Consulting Arborists; or a member of good standing in another nationally recognized tree research, care, and preservation organization.

7-7.02 Report for Individual Tree Removal Permit

A. Tree Removal Permit

The procedure involves three steps which must be completed and approved to remove a protected tree. The information contained within the application will be reviewed by the City Arborist for written response within aproxiamately 10 working days.

B. Submittals

For this purpose, the following information is to be submitted to the City for review:

A completed application for the protected tree removal.

A filing fee for review and records management.

An arborist report prepared by a certified arborist

C. Written authorization

To remove a publicly-owned tree (street tree), the property owner shall first have obtained written permission from the City Engineer. For a protected tree on private property, the permit from the Community Development Department must be on site when the tree is being removed. For a designated tree in property development, the approved plans serve as the approval and no separate written permit is needed.

D. Type of Report: Letter Format

A brief format is acceptable for removal or development and can generally be used for assessing one or two trees. The report is to be on letterhead stationery of the individual preparing the report, including their ISA Certification number.

1. Removal

If for a tree removal (i.e., an application request for a single tree removal only, not in connection with a property development), the report shall provide information and determination whether the tree is dead, hazardous or constitutes a nuisance.

2. Development

If for development on a single family residential lot (not a subdivision), the report shall also clearly indicate whether or not any protected or designated tree is so close to the 'building area or building footprint' that it will be killed or permanently injured by disturbance. The report must make specific recommendations to protect and preserve the tree during the course of construction that are consistent with the specifications within this specification.

7-7.03 Letter Report – Submittals

A. Standard information

All letter reports shall contain the following information: Arborist name and certification number; purpose of the report and for whom; site address; date of the inspection(s); a to-scale diagram of the tree(s) location, accurate size of the trunk diameter (measurement taken at 54-inches above natural

grade); perimeter of leaf canopy; proximity to structures; condition of the tree health (and/or decay presence), condition of the tree structure, imminent danger of failing (ISA Hazard Rating, see appendix C); interface with utility services; conclusion and recommendation(s), photographs (encouraged) and Tree Protection Instructions (if needed).

B. Specific situations

Other conditions may require the following additional information on an as-needed basis if requested by the reviewing City staff: tree protection plans, appraised value, and any other supporting information, photographs, diagrams, etc. that may be necessary.

C. Type of Report – Tree Survey Format

A more extensive 'Tree Survey Report' is required for all development projects except those identified in above. The report shall inventory all trees that are greater than 4-inches in diameter (measured at 12-inches above natural grade) on site, including trees to be removed, relocated and retained on the property (including trees on neighboring properties that overhang the project site) and all street trees in the right-of-way within 30-feet of the project. In addition to information required in a letter report, the Tree Survey Report, shall include an inventory of the trees, site plan, appraised value of the trees and any other information pertinent to the project.

7-7.04 Survey Report - Submittals

A. Items to include

All Tree Survey Reports shall contain the following information: Arborist name and certification number; cover letter; title page; table of contents (if necessary); purpose of the report and for whom; site address; date of the inspection(s); site plan (showing each tree location by number that correlates with the tree inventory on plans; tree inventory data (include tree species, size, health, structure, etc. for all trees on the project site, including those to be removed (tables may be used); condition of the trees (include information with respect to health, structure, decay, imminent danger of falling, existing property lines, structures and utility services) conclusion, recommendation(s) and rated for suitability for preservation. The report shall include a separate list of all protected trees with location numbers. If necessary, other supporting information, photographs, diagrams, etc. may be required or provided.

B. Appraised Value

The monetary value that each tree contributes to the real estate value of the property shall be determined and listed separately within the Tree Survey Report. The formula used should be noted.

7-7.05 Tree Protection and Preservation Report

All protected or designated trees to be retained on a development site shall be shown on approved sets of civil, building and landscape plans and shall be protected during the construction process. A Tree Protection and Preservation Plan submitted for review by the Planning Division is required when trees to

be saved may be injured by disturbance. The tree preservation plan shall assume compliance with these specifications. In addition, the following submittal information must be included in the report:

A. Scope & Construction Phasing

The tree protection and preservation plan shall identify, but not be limited to, written recommendations for the health and long-term welfare of trees that are to be followed during the following distinct phases and conditions: pre-construction; during construction, post construction, demolition activities; methods of avoiding injury, damage treatment and inspections. Schedules
shall be included.

B. Tree Protection Zone

The tree protection and preservation plan shall establish a tree protection zone (TPZ) for each tree to be fenced and clearly outline site-specific measures for protection of the trees during construction and describe a plan for continued maintenance of those trees after construction. After project approval, any changes to the protection measures must be approved in writing, by the City Arborist. The tree protection plan shall include the following site plan elements:

C. Site Plan

1. Disclosure of all trees on and near the site

The property owner or designee shall provide accurate information to the project arborist to develop the tree protection measures and to enable accurate recommendations to insure their survival. This site plan shall accurately show the surveyed location, species, size of trunk and leaf
canopy; show the drip line of any neighboring trees that may overhang the site and street trees that are within 30-feet on each side of the project. Failure to show a tree on the plans and later determined to be affected by construction may require the work to stop until mitigation can be agreed upon by the property owner and the City.

2. Plans submitted to the City

In addition to the above information, final improvement plans shall include and show the following information: show the tree protection zone of any tree to be retained and denote a 5-foot chain link type fencing around the protected zone of each tree or group of trees (to be clearly identified as such on all plans as a bold-dashed line); permeable paving located within the drip line area; approved utility pathways; grade changes; surface and subsurface drainage and aeration systems to be used; walls, tree wells, retaining walls and grade change barriers, both temporary and permanent; landscaping and irrigation within drip line of trees.

3. Plans must show tree protection

Protective tree fencing identified within the arborist report, both written and diagrammatic, shall be clearly shown as a bold, dashed line on the approved site plans submitted for demolition, grading, construction, building permit or any other aspects that are relevant to the project.

7-7.06 Tree Appraisal

Landscape value may contribute from seven to 20-percent of the real estate property value. An individual tree has an inherent value to the real estate that can be determined by an appraisal prepared by a certified arborist. An appraisal is a process for determining a monetary opinion of the value of a tree as it relates to either the property, a group of trees and/or the immediate community. A qualified certified arborist is required to determine this value, and must exercise good and fair judgment by adjusting the basic value by the tree's condition and location. There are two methods to determine tree value; (1) the Replacement Method, based upon the size and availability of the replacement tree or, (2) the Trunk Formula Method, if the tree cannot be replaced (e.g. not sufficient room on site or it is too large to replace). In all cases, the type of formula used must be identified.

A. Appraisal Methods

The certified arborist must prepare the appraisal by using the most current edition of the 'Guide for Plant Appraisal', published by the Council of Tree and Landscape Appraisers, and the most recent 'Form for Northern California' established by the International Society of Arboriculture.

1. The Replacement Cost Method

Applies to smaller trees with a trunk size up to 4-inches in diameter or, 48inch box size trees (replaceable.) For this method, the appraised value shall be determined by combining: price quote + transportation + planting + other costs and applying the condition and location value to the tree. The sum of these is the appraised replacement cost.

2. The Trunk Formula Method

Applies to trees that are too large for practical replacement (transplanting) and shall be appraised by: determining the basic tree value and adjusting this value by a condition and location ratings. The appraised value shall be determined by using the most recent edition of the 'Guide for Plant Appraisal', published by the Council of Tree and Landscape Appraisers. The Trunk Formula or Replacement Method Forms for Northern California established by the International Society of Arboriculture must be used to compute the appraised value. All trees with a stem larger than 4-inches in diameter when measured at 12-inches above natural grade shall be calculated in this manner.

CHAPTER - 8

EROSION CONTROL

8-1.01 GENERAL

A. Erosion Control shall consist of, but not be limited to, constructing facilities and taking measures necessary to prevent, control, and abate water, mud, construction materials, hazardous materials and erosion damage to public and private property as a result of the contractor's operations.

B. Conformance with the requirements of this section shall in no way relieve the contractor from the contractor's responsibilities, as provided in §13-1, Water Pollution control of the State Standard Specifications.

C. Construction vehicles and equipment entering existing paved areas shall be free of mud, silt and other debris during all phases of work. Mud, silt and other debris shall not be tracked on paved surfaces. If such materials are tracked on the streets or other paved areas then the contractor shall immediately remove these materials.

D. Stockpiling of materials on the right-of-way shall not be allowed unless otherwise approved by the City Engineer. Stockpiling of dirt on paved areas shall not be allowed.

E. The contractor shall sweep the work area and clean up the work site daily.

F. If a Storm Water Pollution Prevention Plan (SWPPP) is required for the project then the contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting and maintaining the control measures included in the SWPPP and for removing and disposing of temporary control measures.

G. The contractor shall construct supplementary erosion control to facilities that are necessary to protect property.

H. The contractor shall conduct his operations so that storm runoff will be contained within the site or channeled into the storm drain system which serves the runoff area. Storm runoff from the area shall not be diverted to another runoff area.

I. Storm drain systems, toe of slope drains, and outlet structures shall be constructed and operating prior placing an embankment. Drainage structures shall be provided to channel storm runoff water into the respective permanent storm drain system during construction. Mud and silt shall be settled from the storm runoff before the runoff enters the drain system.

J. Embankment area, while being brought up to grade and during periods of completion prior to final roadbed construction, shall be protected to eliminate erosion and the situation of downstream facilities and adjacent areas. These measures may include, but shall not be limited to: temporary downdrains, either in the form of pipes or paved ditches with protected outfalls areas; graded berms around areas to eliminate erosion of embankment slopes by surface runoff; confined ponding areas to desilt runoff, and temporary check dams in toe of slope ditches to desilt runoff.

K. Excavation areas, while being brought to grade, shall be protected from erosion and the resulting siltation of downstream facilities and adjacent areas. These measures may include, but shall not be limited to: check dams; confined ponding areas to desilt the runoff; and protection, such as sandbags around inlets which have not been brought up to grade.

L. Contour graded areas shall be protected against erosion and the resulting siltation of downstream facilities and adjacent areas during grading operations. Various measures may include, but shall not be limited to: the use of graded contour berms to control sheet flow, supplemental grading of large areas around temporary or unfinished inlet structures to provide desilting basins; and temporary ditch paving.

M. During embankment construction, and earth berm or appropriate grading to direct drainage away from the edge of the top of the embankment shall be constructed and maintained on those embankments where earthwork operations are not in progress.

N. Special attention will be required to protect areas, which have been cleared, and grubbed prior to excavation or embankment operations. Measures may include, but shall not be limited to, desilting basins, contour graded ditches, paved and unpaved ditches, and filter fabric fences.

O. After each storm, desilting basins shall be checked against their design capacity and silt and sediment shall be removed as required to maintain capacity.

8-1.02 (BLANK)

8-1.03 EXECUTION

A. To ensure the proper implementation and functioning of erosion control measures, the contractor shall regularly inspect and maintain the construction site for the control measures identified in the Storm Water Pollution Prevention Plan (SWPPP). The contractor shall identify corrective actions and time frames to address any damaged measures to reinitiate any measures that have been discontinued.

B. If contractor identifies a deficiency in the deployment or functioning of an identified control measure then the deficiency shall be corrected by the contractor. If the City Engineer identifies a deficiency in the deployment or functioning of an identified control measure then the contractor will be notified in writing and the deficiencies shall be corrected by the contractor.

8-1.04 MEASUREMENT AND PAYMENT

Attention is directed to §9-1.16, Progress Payments and §9-1.17, Payment after Contract Acceptance of the State Standard Specifications. Payments for Erosion Control will be made as follows:

A. When the monthly partial payment estimate of the amount earned, not including the amount earned for Erosion Control, is 5 percent or more of the original contract amount, 50 percent of the contract item price for Erosion Control or 5 percent of the original contract amount, whichever is less, will be included in the estimate for payment.

B. When the monthly partial payment estimate of the amount earned, not including the amount earned for Erosion Control, is 10 percent or more of the original contract amount, the total amount earned for Erosion Control shall be 75 percent of the contract item price for Erosion Control or 7.5 percent of the original contract amount, whichever is less, and that amount will be included in the estimate for payment.

C. When the monthly partial payment estimate of the amount earned, not including the amount earned for Erosion Control, is 20 percent or more of the original contract amount, the total amount earned for Erosion Control shall be 95 percent of the contract item price for Erosion Control or 9.5 percent of the original contract amount, whichever is less, and that amount will be included in the estimate for payment.

D. When the monthly partial payment estimate of the amount earned, not including the amount earned for Erosion Control, is 50 percent or more of the original contract amount, the total amount earned for Erosion Control shall be 100 percent of the contract item price for Erosion Control or 10 percent of the original contract amount, whichever is less, and that amount will be included in the estimate for payment.

E. After acceptance of the contract pursuant to §9-1.17, Payment After Contract Acceptance of the State Standard Specifications, the amount, if any, of the contract item price for Erosion Control in excess of 10 percent of the original contract amount will be included for payment in the first estimate made in conformance with the provisions in § 9-1.17, Payment after Contract Acceptance of the State Standard Specifications.

The contract lump sum price paid for Erosion Control shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in Erosion Control as specified herein.

The adjustment provisions in §4-1.05, Changes and Extra Work of the State Standard Specifications, and the retention of funds provisions in §9-1.16E, Withholds of the State Standard Specifications shall not apply to the contract lump sum item of Erosion Control.

When other contract items are adjusted as provided in §4-1.05, Changes and Extra Work of the State Standard Specifications, if the costs applicable to an item of work include Erosion Control costs then those Erosion Control costs will be deemed to have been recovered by the contractor by the payments

made for Erosion Control, and will be excluded from consideration in determining compensation under §4-1.05, Changes and Extra Work of the State Standard Specifications.

When the contract does not include a contract pay item for Erosion Control as above specified, full compensation for any necessary Erosion Control required shall be included in the prices paid for the various contract items of work involved and additional compensation will not be allowed.

CHAPTER - 9

TRAFFIC

TEMPORARY TRAFFIC CONTROL DURING CONSTRUCTION

9-1.01 GENERAL

A. Description

This work includes the furnishing of labor, materials, tools and equipment to construct, install and maintain the temporary traffic control device in accordance with the approved project plans, these specifications, the California Manual on Uniform Traffic Control Devices (CA MUTCD), Part 6, Temporary Traffic Control, and §12, Temporary Traffic Control of the State Standard Specifications.

B. General Responsibilities

The contractor is responsible for public convenience and public safety in accordance with §7-1.03, Public Convenience and §7-1.04, Public Safety of the State Standard Specifications.

All persons or agencies doing work in or on City streets and highways shall be responsible for:

1. Supplying installing and maintaining traffic control equipment.

2. Providing flagmen.

3. Informing occupants of properties that may be affected by the work by written notice of parking prohibitions or access limitations. The notification shall be approved by the City Engineer.

4. Removal of traffic control equipment.

5. Notifying Emergency Services (police and fire) and school districts of all street closures and detours.

6. Obtaining all necessary permits and/or approvals for doing work in streets and highways in the City.

C. Overall Authority

Traffic control for all work on streets and highways shall be approved by the City Engineer, and all work must conform to the appropriate sections of these specifications and the California Vehicle Code.

D. Working Areas

In general, unless street are closed to traffic, the work shall be done so that as few traffic lanes as possible are blocked. Where a traffic lane is blocked, as approved by the City Engineer, parking may be prohibited.

9-1.02 MATERIALS

All materials shall conform with the approved plans, these specifications, the California Manual on Uniform Traffic Control Devices (CA MUTCD), Part 6, Temporary Traffic Control, and §12, Temporary Traffic Control of the State Standard Specifications.

A. Signs

The following equipment is used to warn, regulate and guide the public. All equipment shall be clean and in serviceable condition. A signage plan, completed by the contractor shall be approved by the City Engineer prior to posting signs.

1. Except for approved special signs and supplementary signs, all signs shall conform to the Caltrans Traffic Manual. Signage shall be adequate but kept to a minimum to avoid confusion. All signs shall be placed so they can be clearly seen by approaching motorists or pedestrians. Supplementary signs may be used only if authorized by the City Engineer. Sign lettering shall be clear, open capitals of the type approved by the Caltrans Traffic Manual. Each owner shall identify each sign with his name or initials on the back of, or at the bottom of the sign.

2. Where a permanently installed STOP sign (R1-1) is obscured by street work or has to be removed temporarily to permit street work, and the traffic flow which it regulates is still maintained, a portable stop sign shall be placed in line with the permanent stop sign location and at the right-hand side of the roadway used by the traffic regulated by the sign. The person in charge shall notify the City Engineer prior to removing or relocating a stop sign. If a permanent stop sign does not exist then a temporary stop sign shall not be installed unless authorized by the City Engineer.

3. A parking prohibition may be required. NO PARKING signs (R-26) shall be placed along the curb or ditch line and no more than 100 feet apart. Where parking is removed to provide a lane for moving vehicles, it shall be removed normally for at least 150 feet both prior to and beyond the road obstruction. A parking prohibition may only be used with the approval of the City Engineer.

4. The KEEP RIGHT sign (R4-7A) shall be used where motorists must avoid an obstruction in the roadway by keeping only to the right of the obstruction. Where

motorists can go only to the left, all of the roadway to the right shall be barricaded and the remaining open roadway delineated.

The Keep Right sign shall be placed within and at the approach end of the channeling cones so that it can be clearly seen by approaching motorists.

5. The NO RIGHT TURN sign (R3-1) and the NO LEFT TURN sign (R3-2) shall be used at intersections where turns are prohibited because of work in the roadway. Where both turns from a given approach must be prohibited a NO TURNS sign shall be used.

   For a multi-lane approach, the No Left Turn sign shall be placed on the left side and the No Right Turn sign on the right side of approaching traffic at the near side of the intersection street. If both turns are prohibited, a No Turns sign shall be placed at each of the two positions. For a one-lane approach, only one No Turns sign is required and it shall be placed on the right side.

6. DETOUR signs (M4-8) shall be installed as follows:

   a. One detour sign shall be placed at every intersecting street for each direction of flow of the traffic detoured.

   b. A combination detour sign with a street name sign (use name of detoured street) immediately above it shall be placed wherever a detour intersects a major street.

   All detour signs shall be placed so that they are easily seen for an adequate distance (150 feet minimum).

7. Lane reduction signs (W4-2) shall be used when a regular route is kept open, but the number of traffic lanes available for a given traffic movement is reduced. If only one lane remains open for use by opposing traffic, it shall be controlled by flagmen.

8. DETOUR AHEAD signs (W20-2) shall be used where traffic must be detoured.

9. Road closed signs (R11-2) or Bridge out signs (R11-2) shall be used when a section is closed to public travel. The signs shall be placed in combination with a line of Type III barricades at the point of closure. The sign and barricades must be placed so as to be seen plainly by approaching traffic. Provisions shall be made to allow traffic access to their respective properties between the closure point and the point of impassability.

B. Barricades

Barricades shall be used to close streets temporarily and for protection at excavations, new pavement and other street work.

When Class II barricades are used in closing a road they shall be placed so there is no gap in the roadway area large enough for a vehicle to pass. Where work vehicles must pass the barricades, or where local access is not permitted, an opening in the barricades shall be to the side(s) of the Class II barricade fence.

C. Delineators

Delineators must conform to the State of California Traffic Manual. The delineators shall consist of post and paddle type guide markers or cylindrical or cone shaped objects 18 inches to 48 inches in height.

Delineators placed in close proximity to the edge of a traffic lane should be of a material that shall withstand impact without damage to themselves, the striking vehicle or passing traffic. Consideration must also be given to stability against wind or from passing traffic.

All delineators shall have reflectors that are visible to traffic.

D. Flagging

The equipment required and the procedures to be used in flagging traffic through the work area shall be in accordance with Section 6 of the CA MUTCD.

E. Illumination

Lights for use at night (at least from ½ hour before sunset until ½ hour after sunrise or when atmospheric conditions impair visibility) shall consist of the following:

1. Electrical illumination of signs

2. Flasher lights (Type A, Type B, or Type C) These devices are aids against poor visibility. They may not be used alone, but are required to supplement other specified equipment. All equipment must be reflectorized in case the flashers stop functioning.

   All obstructions remaining at night (or during periods of poor visibility such as fog) shall be indicated by reflective barricades or delineators. Normal flasher lights shall not be placed along a line of delineators.

F. Special Equipment

For special cases, such as intermittent crossing of a street by earth moving vehicles, special traffic control may be required. The traffic control for these projects shall be submitted in writing and shall be approved by the City Engineer.

9-1.03 EXECUTION

All execution shall be in accordance with the approved project plans, these specifications, the California Manual on Uniform Traffic Control Devices (CA MUTCD), Part 6, Temporary Traffic Control, and §12, Temporary Traffic Control of the State Standard Specifications.

A. Time of Work

1. On streets where stopping or parking is prohibited during peak traffic hours, work shall not be carried out during those hours without written approval of the City Engineer.

2. Two or more contractors not work at the same time on opposite sides of the same street unless the street is closed.

B. Placing of Equipment

1. No traffic control equipment shall be installed for street work except immediately prior to work commencing and shall be removed immediately when no longer required.

2. Any traffic control equipment not required at any time during the job shall be removed from view during such period.

3. All traffic control equipment, and where practicable, all other equipment not in used, shall be stored clear of the traveled portion of the roadway or sidewalk.

4. No used or other equipment shall be stored so as to create a view obstruction or other unnecessary obstruction to vehicular traffic.

C. Closing Streets

Permission from the City Council shall be obtained for all street closures. The City Engineer shall be notified at least two weeks prior to the actual street closure. For all street closures the following shall apply:

1. A detour shall be provided. A drawing showing the detour and the location and type of all signing shall be submitted to the City Engineer for approval. The plan shall conform to Section 6 of the CA MUTCD.

2. The detour shall be simple and direct.

3. Turns shall be kept to a minimum.

4. Streets less than 20 feet in width shall not be used in the detour route.

5. DETOUR AHEAD signs (W20-2) shall be posted, on the road to be detoured, a sufficient distance in advance to warn motorists A California standard detour sign (C5, with appropriate arrow) shall be posted in advance of all turns in the detour route. Where the detour route signs appear on another major street, the street name of the street being detoured shall appear on a sign placed above the detour sign. Appropriate detour signs shall be placed on all across streets.

6. Detour routes may need to be protected by temporary stop signs.

7. When detouring a four-lane street on a detour route less than four lanes in width, parking may be prohibited on the detour route at the City Engineer's discretion.

8. The detour route shall be clearly marked where it intersects other cross streets so that motorists shall not turn prematurely back into the construction area or closed portion of the street. These markings shall be in the form of additional detour signs or a Not a Through Street sign or both.

9. ROAD CLOSED signs (R11-2) shall be used only when the road is impassable to traffic and not as a notification of construction activity.

10. All detour signs and barricades shall be maintained by the contractor and adjusted as constructions progresses.

11. All road closures, except where covered by a development agreement or contract with the City, shall require a cash deposit guarantee to ensure that all requirements of the road closure condition are met.

D. Notice of Surface Conditions

During road surface work (e.g.: street paving, patching, grading) where the street is kept open to traffic, freshly placed concrete, hot asphalt patches, sharp differences between the road surface and raised manholes, etc., must be clearly indicated by delineators or reflective barricades.

E. Subsurface Work

1. Excavation

a. Reflective barricades with flashing warning lights shall be installed around the perimeter of all excavations. All pipe excavations in public streets shall be backfilled on the same day.

b. Excavations shall be backfilled as soon as practicable, or covered with steel plates upon approval by the City Engineer.

c. Micro-tunneling may be used for excavations.

d. When pipes are installed across major streets (arterials, expressways) the pipe shall be installed by micro-tunneling. If the street is to be reconstructed in the near future or major safety problems exist with micro-tunneling then the City Engineer may authorized trenching.

2. Manholes

Open manholes are considered to be excavations.

a. Manhole guards shall be placed around unattended open manholes.

b. If an open manhole is in a roadway then signs and delineators shall be used.

c. Where possible not more than one traffic lane shall be blocked at one time.

d. If an open manhole or excavation is at or near a pedestrian area, reflective barricades with flashing warning lights shall be placed around the opening in the most likely paths of pedestrian travel. A complete ring around the opening shall be formed by affixing caution tape to the tops of barricades surrounding the hole.

F. Completion of Work

All work on streets and highways shall be completed so as to disrupt normal street operations as little as possible. All equipment shall be removed.

G. Emergency Work

Emergency work shall be given priority over traffic insofar as is necessary until the emergency is over. Nevertheless, every effort shall be made to protect the public, the workman, and the job.

9-1.04 MEASUREMENT AND PAYMENT

Temporary traffic control during construction will be paid for on a lump sun basis, which lump sum price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidental, and for doing all the work involved in furnishing, placing, maintaining, and when no longer required, removing the temporary traffic control devices. One half of the contract sum price will be paid after the initial placement of the traffic control devices. The remaining portion of the contract lump sum price will be paid in the final contract payment.

TRAFFIC STRIPES AND PAVEMENT MARKINGS

9-2.01 GENERAL

A. Requirement

The contractor shall provide all materials, equipment, and labor necessary to furnish and place all traffic stripes and pavement markings, which may include, but is not limited to, removal of existing striping, legends, and pavement markers, placement of pavement markers, placement of thermoplastic and painted striping and marking and all other appurtenant work, complete and in place, as shown on the approved project plans and in accordance with these specifications.

B. Reference Specifications, Codes, and Standards

1. State of California (Caltrans)

a. California Manual on Uniform Traffic Control Devices (CA MUTCD)
b. Standard Specifications
Section 15 Existing Facilities
Section 84 Markings
Section 94 Asphaltic Emulsions
c. Standard Plans
d. Traffic Manual

C. Contractor Submittals

The contractor shall provide certificates of compliance for all proposed products and materials.

9-2.02 MATERIALS

Markings

1. Unless otherwise noted on the approved project plans, all permanent traffic stripes and pavement markings shall be thermoplastic.

a. Thermoplastic for traffic stripes and pavement markings shall conform to §84-2.02B, Thermoplastic Markings of the State Standard Specifications.

When thermoplastic marking is applied within a crosswalk or a bike lane, the following composition shall be used with a maximum thickness of 0.12 inches:

Binder 20% (18% min)

Glass Beads	20%	(15% min)
TiO_2 Pigment	10%	(7% min)
Filler	35%	(37% max)
Cullet	15 %	(10% min)

The crushed glass cullet shall be produced from cullet of clear glass, with a maximum size of 850 micrometers (100% passing by weight) and a minimum size of 425 micrometers (0-5%% passing by weight). The skid resistance shall be a minimum of 55 BPN.

b. Paint for traffic stripes and pavement markings shall conform to §84-2.02C, Paint Markings of the State Standard Specifications.

c. Pavement markings shall conform to §84, Markings of the State Standard Specifications. Fire hydrant markers shall be two-way, reflective blue markers.

d. Type II and III pavement arrows shall be installed on streets with speed limits of 45 mph or greater. Type I, IV, VII, and VIII pavement arrows shall be installed on all other streets.

2. Adhesive shall be the hot melt bituminous type conforming to §85, Pavement Markers of the State Standard Specifications.

9-2.03 EXECUTION

A. General

1. Centerline and lane lines shall be re-established the same day as they are removed by the use of temporary reflective markers placed at 24 feet on center maximum spacing.

2. Stop bars, crosswalks, advanced school crossing legends and arrows, shall be re-established the same day as they are removed using paint or traffic tape and shall match the width, size, and color as the removed markings unless otherwise shown on the approved project plans.

3. Temporary traffic stripes and pavement markings placed on the finish lift of asphalt concrete shall be made with temporary traffic tape. Temporary traffic stripes and pavement markings placed on sub-lifts of asphalt concrete may be made with paint or traffic tape. Traffic tape shall not be placed on slurry seal surfaces.

B. Remove Existing Traffic Stripes and Pavement Markings

1. All removed traffic stripes and pavement markings and excess material shall become the property of the contractor shall be disposed of in a legal and proper manner. Removal and disposal of existing traffic markings and excess material shall conform to §15, Existing Facilities of the State Standard Specifications.

2. The contractor shall conduct his work so as not to damage existing pavement and public improvements. Any resultant damage determined to be excessive by the City Engineer shall be repaired in kind by the contractor at his sole expense.

3. Damage to the pavement resulting from removal of pavement markers includes any depression that is more than 1/4-inch deep. Damage shall be repaired by the contractor by filling the depression with hot melt bituminous adhesive to the satisfaction of the City Engineer.

4. Where blast cleaning is used for the removal of traffic stripes and pavement markings or objectionable material, the residue shall be immediately removed after contact between the sand and the treated surface. Removal shall be by a vacuum operating concurrently with the blast cleaning operation.

5. Where removal of traffic stripes and pavement markings is done by grinding or sandblasting methods, the affected pavement surface shall be covered by applying an asphaltic emulsion conforming to §94, Asphaltic Emulsions of the State Standard Specifications.

6. All reference markings made by the contractor shall be done with spray chalk.

7. All temporary traffic stripes and pavement markings shall be removed by the contractor on the same day as placement of the permanent striping and markings.

C. Traffic Stripes and Pavement Markings Installation

1. Placement of all traffic stripes and pavement markings shall be in conformance with §84, Markings of the State Standard Specifications, the State Standard Plans and the approved project plans. In case of conflict the approved project plans govern.

2. All layouts shall be inspected and approved by the City Engineer prior to permanent placement of the traffic stripes and pavement markings. The contractor shall notify the City Engineer at least 48 hours (2 working days) prior to the start of the scheduled placement.

3. Any overlap, dripping, or tracking of fresh thermoplastic or paint onto unmarked surfacing shall be removed to the satisfaction of the City Engineer. The contractor is liable for any resultant damage.

4. Thermoplastic and paint shall be placed as close as possible to existing utility structure and monument frames and covers and shall not cover them.

5. The contractor shall protect all fresh thermoplastic and paint and shall repair or replace all damage to traffic stripes and pavement markings caused by his failure to do so at his expense.

6. All traffic stripes and pavement markings, new or existing, within or adjacent to the work limits which become defaced or damaged during the contractor's operations shall be replaced by the contractor at his expense. This work shall be done concurrently with other traffic marking operations in the immediate area. The City Engineer shall determine which stripes or legends are defaced or damaged.

7. Fire hydrant markers shall be installed at all fire hydrant locations as shown on the approved project plans.

9-2.04 MEASUREMENT AND PAYMENT

Payment for all traffic stripes, pavement markings, and pavement markers shall include full compensation for furnishing all labor, material, tools, equipment, adhesive and all other incidentals to completely install the traffic stripes, pavement markings, and pavement markers

A. Traffic Stripes and Pavement Markings:

All traffic stripes shall be measured by the linear foot along the line of the traffic stripe, without deductions for gaps in broken (skipped) traffic stripes. Payment for all thermoplastic traffic stripes shall be of the widths designated in the contract documents. All pavement markings and legends shall be measured by the square foot of the area covered. All pavement markings and legends shall be paid for by the square foot of actual area covered.

B. Pavement Markers

All pavement markers shall be measured per each.

C. Signs

The contract unit price paid for roadside signs shall include all labor, materials, tools, equipment, concrete, and incidentals for installing the signs.

TRAFFIC SIGNS

9-3.01 GENERAL

A. The contractor shall provide all materials, equipment, and labor necessary to furnish and install all roadside signs, street name signs, and City/private property off-street signs, and all appurtenant work, complete in place, as shown on the approved project plans and in accordance to these specifications.

B. Reference Specifications, Codes, and Standards

1. State of California (Caltrans)

a. California Manual on Uniform Traffic Control Devices (CA MUTCD)
b. Standard Specifications
Section 15 Existing Facilities
Section 84 Markings
Section 94 Asphaltic Emulsions
c. Standard Plans
d. Traffic Manual

2. Commercial Standards:

ASTM C 653 Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed,) by the Hot-Dip Process
USA Underground Service Alert

C. Contractor Submittals

The contractor shall provide certificates of compliance for all proposed products and materials.

D. Utility Locations

1. The contractor's attention is called to the fact that utilities are present in the work areas. The contractor has the responsibility to notify the utility companies having facilities in the project work areas at least 48 hours (2 working days) prior to beginning work to locate the utilities before beginning the underground work. Utilities may be notified by contacting USA, Underground Service Alert, at or by dialing 811.

2. For utilities not marked by USA, such as irrigation mains and laterals or on site services, the contractor shall contact the property owner for assistance in locating said facilities.

3. The contractor shall be responsible for repairing, at his own cost, any damage to utilities or irrigation facilities encountered during construction.

E. Private Property Signs

1. All private property signs are subject to approval by the City of Ceres Community Development Department and shall be in conformance with the Zoning Ordinance, the Sign Ordinance, and all other City of Ceres regulations.

9-3.02 MATERIALS

A. Signs

1. Roadside signs shall be of the type as shown on the approved project plans and I accordance with the Caltrans Traffic Manual unless noted otherwise on the approved project plans. Signs shall conform to §56, Signs of the State Standard Specifications and the Caltrans Approved Sign Specification Sheets.

2. Sign Plates shall be 0.08 gage aluminum alloy. Sign message shall be made using engineering grade sheeting 3M or equal. Type N markers shall be made using high intensity reflective sheeting and shall be 3M or equal.

3. Street names and size of signs shall be as shown on the approved project plans.

4. City/private property off-street signs shall have message and size of sign as shown on the approved project plans.

5. All signs in street right-of-way shall have "COC" and the installation date etched or stamped on the back of sign with ¼" letters situated at the lower right corner of the back of the sign.

B. Posts

1. Roadside Signs, Street Name Signs, and City Off-Street Signs

a. All posts for signs installed on City property or within the public right of way shall be square formed steel tube, telescoping metal breakaway type, Unistrut Telespar Sign Support System or equal, of the size and dimensions as shown on the approved project plans.

b. Tubing shall be 12 gage strip steel, structural quality, conforming to ASTM A-570 Grade 33.

c. Galvanized tubing shall be 12 gage strip steel, structural quality, conforming to ASTM A 446 Grade A; hot-dipped galvanized with a

1.25-ounce zinc coat, interior and exterior, conforming to ASTM C 653 coating designation G90; corner welds shall be zinc coated.

C. Hardware

1. Roadside, Street Name, and City Off-Street Signs: Hardware for signs installed on City property or within the public right of way, shall be as shown on the approved project plans and shall conform to the requirements of Unistrut Telespar Sign Support System or equal. Drive rivets to be Unistrut TL 3806 or equal.

2. Street Name Sign Installation on Street Lights

a. The cantilever bracket supports for street name signs installed on round street light standards shall conform to the requirements of SIGNFIX Cantilever Sign System or an approved equal.

b. For sign blanks up to 20 inches in length with a maximum area of 2 square feet the contractor shall use SIGNFIX Stainless Steel Mini Cantilever Brackets with ⅝-inch 0.03 gauge stainless steel band and buckle BAND-IT or an approved equal.

c. For sign blanks up to 42 inches in length with a maximum area of 6 square feet, use SIGNFIX V-Back Aluminum Cantilever Brackets with ¾-inch 0.03 gauge stainless steel band and buckle BAND-IT or an approved equal.

9-3.03 EXECUTION

A. General

1. All sign locations on City property must be inspected and approved by the City Engineer prior to installation. The contractor shall notify the City Engineer at least 48 hours (2 working days) prior to the start of the scheduled sign installation.

2. The locations of all Off-Street signs must be approved by the Community Development Department before the signs are installed.

3. All reference markings made by the contractor shall be done with spray chalk and shall be removed by the contractor after installation of the signs.

4. Roadside signs shall be installed 6 inches behind 5 feet sidewalk, and 24 inches behind face of curb where there is a separated sidewalk, 10 feet sidewalk or no sidewalk unless otherwise noted on the approved project plans.

5. All utilities damaged by the contractor shall be repaired and replaced by the contractor at his expense to the satisfaction of the City Engineer and the owner of the utility.

B. Installation of Post

1. Installation of roadside, street name, and City off-street signs installed on City property shall be at the locations shown on the approved project plans.

a. Installation shall be as shown on the approved project plans and shall conform to the requirements of Unistrut Telespar Sign Support System or equal.

b. The square end of the anchor shall not be modified or pointed, but shall be capable of being driven into the ground by the use of an approved driving cap. The driving cap shall be reusable and shall allow the square anchors to be manually driven into the ground with the aid of a sledge hammer or a jack hammer without deforming the anchor or the driving cap.

C. Installation in Existing Sidewalk

1. For signs installed in existing sidewalks a 6-inch core shall be drilled, the anchor installed, the core filled with Class B portland cement concrete in conforming to §90, Concrete of the State Standard Specifications. Existing surfacing other than portland cement concrete shall be replaced in kind, with the replacement matching the existing product, depth, and pattern, to the satisfaction of the City Engineer. The sleeve shall be protected so that the concrete will not encroach into the post.

D. Installation of Sign

1. Roadside, Street Name, and City Off-Street Signs: Mounting of the sign to the pole for roadside, street name, and City off-street signs on City property shall be as shown on the approved project plans and shall conform to the requirements of Unistrut Telespar Sign Support System or an approved equal.

2. Mounting of Street Name Signs on street light standards using Cantilever support brackets shall be installed in accordance with the manufacturer's recommendations. Cantilever bracket system shall be installed on both the top and bottom of each sign.

3. A Tow-Away Zone sign (R26K) shall be installed below each No Stopping Fire Lane sign (R26F) in designated fire lanes.

9-3.04 MEASUREMENT AND PAYMENT

The Contract unit price paid for traffic signs shall include all labor, materials, tools, equipment, concrete, and incidentals for installing the roadside signs complete.

TRAFFIC SIGNALS

9-4.01 GENERAL

A. Requirement

The contractor shall provide all material, equipment, and labor necessary to furnish and install all traffic signals, all associated hardware and equipment, and all appurtenant work to provide a functional installation, complete in place and operable, as shown on the approved project plans..

B. Reference Specifications, Codes, and Standards

1. Federal Specifications and Standards:

United States Department of Transportation, Manual of Uniform Traffic Control Devices

595a Federal Standard.

NEC National Electric Code.

NEMA National Electric Manufacturers Association.

2. State of California (Caltrans) Standards

Standard Specifications

Standard Plans

Traffic Manual

3. Commercial Standards:

UL Underwriters Laboratories, Inc.

C. Contractor Submittals

1. The contractor shall provide certificates of compliance for all proposed products and materials.

2. The contractor shall submit the controller cabinet schematic wiring diagram and intersection sketch on one sheet, at the time the controller cabinet is delivered to the City Engineer for testing, or prior to any signal modifications which require modifications to the controller cabinet. The contractor shall notify the City of Ceres Public Works Department at least 72 hours (3 working days) prior to delivery of controller cabinets for testing.

3. The contractor shall furnish a maintenance manual for all controller units; auxiliary equipment; and vehicle detectors sensor units, control units and amplifiers. The maintenance manual and the required operation manual may be combined into one manual. One set of traffic signal Drawings and traffic signal Specifications, and the maintenance manual, or combined maintenance and operation manual, for the controller shall be submitted at the time the controllers are delivered to the City for testing. The maintenance manual shall include, but is not necessarily limited to, the following items:

   a. manufacturer's specifications
   b. design characteristics
   c. general operation theory
   d. function of all controls
   e. trouble-shooting procedure (diagnostic routine)
   f. block circuit diagram
   g. geographical layout of components
   h. schematic diagrams
   i. list of replaceable component parts with stock numbers.

4. The contractor shall submit to the City Engineer a list of equipment and materials proposed for to be used in accordance with §86-1.01C, Electrical System of the State Standard Specifications.

5. The controller cabinet and its components shall be tested and certified by the controller manufacturer prior to delivery to the City for testing.

D. Manufacturer's Service Representative

1. The contractor shall arrange to have a signal technician, qualified to work on the controller and employed by the controller manufacturer or his representative, present at the time the traffic signal is turned on, when signal interconnect cable is terminated, when emergency vehicle preemption system is activated, when a new signal phase is activated, or when any modifications are required to the controller cabinet, except for termination of the field wires.

2. When video detection is used, the contractor shall arrange to have a signal technician, qualified to work on the controller and employed by the video detection manufacturer or his representative, present at the time the traffic signal is turned on, or when any video detection is activated on an existing signal.

9-4.02 MATERIALS

A. General

Traffic signals and street lights shall conform to §86, Electrical Systems of the State Standard Specifications and the State Standard Plans.

B. Foundations

Portland cement concrete for standards, poles, pedestals and posts shall conform with §90, Concrete of the State Standard Specifications.

C. Standards, Steel Pedestals and Posts

1. Standards, poles, pedestals, and posts shall conform to the provision in §86-2.01C, Standards, Electrical Systems of the State Standard Specifications.

2. All traffic signal standards and posts shall be galvanized steel. Locations of traffic signals and street lighting standards and posts shall be marked in the field with marking chalk for review by the City Engineer before beginning any installation.

D. Conduit

1. Conduit & Accessories shall conform to the provisions in §86-1.02B, Electrical Systems of the State Standard Specifications.

2. Conduit and fittings to be installed underground shall be schedule 40 PVC type. Conduits designated for signal interconnect shall be installed satisfying the requirements for both twisted pair and fiber optic cables use (e.g., sweeps/bends for fiber optic should be used).

3. Conduit installed in concrete base shall be the same type size and quality used for the underground conduit runs.

4. The size of conduit used shall be as shown on the approved project plans, but in no case shall conduit be less than 1-1/2 inches in diameter. The contractor may, at his option and expense, use conduit of larger size than that shown or specified, provided the larger size is used for the entire length of the run from pull box to pull box. Reducing couplings will not be allowed.

5. Conduit installation shall conform to the provisions in §86-2.01C, Electrical Systems of the State Standard Specifications.

E. Pull Boxes

1. Pull boxes shall conform to the provisions in §86-2.01C(3), Electrical Systems of the State Standard Specifications.

2. Pull box size shall be No. 5 for traffic signals, No. 3-1/2 for hardwire interconnect, No. 6 for homeruns, and No. 6E for fiber optic communications unless otherwise shown on the approved project plans. The cover shall be reinforced concrete.

3. Interconnect pull boxes shall have lids embossed with "Interconnect" and traffic signal pull boxes with "Traffic Signal."

F. Conductors and Cables

1. Conductors and cables shall conform to the provisions in §86-1.02F, Electrical Systems, of the State Standard Specifications. Splices shall be insulated by Method B.

2. Fuse holders shall be non-compression type, and shall be BUSS HEB-AA or equal.

3. The fiber optic cable requirements are as follows:

Fiber Cable shall be all dielectric, loose tube with 48 single strand fibers per loose tube. No ribbon fiber shall be utilized. Where available, within contract, water protection tape rather than gel filling shall be utilized. Fiber and fiber cable construction shall adhere to RUS PE-90 and Bellcore GR-20. Cable shall adhere to standard industry fiber and loose tube color coding, as defined by RUS PE-90 and Bellcore GR-20. The Cable shall be constructed to provide a minimum of 30 years useful life when installed in conduit. Fiber shall be 8.3 microns (normal) diameter with mode field diameters for depressed cladding being 8.8 microns ± 0.5 microns at 1310 nm and 10.0 ±1.0 microns at 1550 nm; for matched cladding mode field shall be 9.3 microns ± 0.5 microns and 10.5 ± 1.0 microns for respective wave lengths. (Cladding types shall not be mixed during fiber deployment). The fiber shall be protected with a cladding with diameter of 125.0 ±1.0 microns.

The fiber within the cable shall have an attenuation of no greater than 0.35 dB/Km at 1310 nm and 0.25 dB/Km at 1550 nm. Water peak attenuation 1385 nm (±3 nm) shall not exceed 2.5 dB/Km. The attenuation of the fiber shall be distributed uniformly throughout its length such that there are no localized discontinuities in excess of 0.1dB at either 1310 nm or 1550 nm as determined by TIA 455-59 Fiber Optic Test Procedures (FOTP).

The fibers shall have a maximum dispersion of 2.8 picoseconds/nanometer – km (ps/nm-km) over an optical wavelength range of 1290 to 1330 nm and a maximum value of zero dispersion slope of 0.093 ps/(km-nm^2). Dispersion tests are in accordance with TIA 455-17S FOTP. The manufacturers shall have tested for dispersion as required by Bellcore GR – 20 or RUS PE-90. New factory tests are required only if the fiber has not been pre-tested and qualified to standards.

The construction of the cable shall follow referenced standards for construction of dielectric, loose tube fiber cable with the exception that water-blocking tape is acceptable and preferred. The dielectric strength member shall support a tensile force of 2700 Newtons during cable installation and shall protect fiber attenuation change during installation allowing no greater than 0.05 dB/Km increase over manufacturer's specified fiber attenuation.

The cable shall include a ripcord under the sheath to support easy removal of the sheaths. The sheaths shall be marked in accordance with National Electric Safety Code 350 G. The Cable Sheath shall also be permanently marked with the manufacturer's name, type cable and "Fiber Optic Cable." There shall also be sequential length markers that are accurate within 1%. Marking size shall be such as to the easily read by a technician. The Contractor shall submit cut sheets for cable approval to the Construction Manager identifying the marking size, repetition and symbol per National Electrical Safety Code (i.e., Telephone Symbol).

Cable diameter for up to 72 fibers should be approximately 13mm. Cable shall be rated for an operating temperature of -40^0C to $+75^0$C. The cable shall contain no metal and shall conform to the National Electric Code's definition of fiber.

Cable shall be shipped from the factory with protective wrapping and with sealed ends. The cable shall include a waterproof tag with the results of factory OTDR attenuation test as well as:

Contract Number/Identification
Manufacturer's Name/Address
Manufacturer's Part Number
Type of Cable
Number of Loose Tubes and Fiber
Beginning and Ending Length Marks
Reel Number
Ship Date
Weight of Cable and Reel

Cable shall be of a continuous length on the reels. The Cable runs are as shown on plans. Slack cable requirements shall be considered by the Contractor, based on normal industry installation practices, in computing required cable length.

12-Fiber drop cables with 12-fiber jumper cables shall be utilized from splice closures to optical transceivers located in field equipment cabinet. Due to the limited space in most of the field equipment cabinets, drop cables shall be fabricated with integrated optical jumper cables. Each jumper cable shall be 900 microns and terminated with an SC (male) connector having integral strain relief. The jumper cables shall be molded into the drop cable providing strain relief. Jumper cable construction shall comply with Bellcore GR-20. Transition from drop cable to jumper cable shall be waterproof and shall provide mechanical protection for fibers and splices.

The drop cable shall comply with the fiber cable special provisions of this document. The length of the jumper cable shall be 2 meters (minimum). The jumper cable will interface with the SC (Female) connectors on the optical transceivers installed in field equipment cabinets.

The contractor is responsible for interfacing the SC (Male) connectors to test optical-to-electrical communications performance between optical transceiver installation locations. The contractor is responsible for correct splicing of the drop cable onto the backbone cable in accordance with splice tables to be provided by the City. Each drop cable shall have 5 splices to the backbone cable. The Contractor is responsible for point-to-point continuity in accordance with splice tables and assuring point-to-point optical path loss (attenuation) is within specifications. Jumper cables shall be marked R-1, R-2, T-1, T-2 or R/T for video optical transceivers, which require only one fiber or spare.

The Contractor shall deploy splice closures compatible with the single mode fiber cable selected for deployment and which are compliant with these special provisions. The splice closure shall include a fiber organizer following the guidelines of Bellcore GR-769. The basic splice closure shall also follow the guidelines of Bellcore GR771, "Generic Requirements for Fiber Optic Splice Closures."

The construction of the splice closure shall be such that it:

Provides a protective mechanism for organizing the fiber strands and protecting individual fiber splices
Waterproof design supporting continued submergence in water at normal burial depths (3 feet)
Support main fiber backbone splices to a minimum of two drop/branch cables of 12-24 fiber each.
Any metal parts shall be protected against corrosion
Shall be easy to disassemble and reassemble by a fiber maintenance person
Provided with hanging provisions from the side of a pull/across box
function

Splice closures to be placed in pull boxes shall be attached to the side of the pull box with nylon ties. Slack shall be provided to allow the splice closure to be removed from the pull box for maintenance.

The contractor shall prepare and submit Record Drawings of each splice closure installed, showing each fiber enclosed, fiber color, splices, and unconnected fibers. Record drawings shall be labeled to indicate the splice closure location.

G. Bonding Jumpers and Equipment Grounding Conductors

Bonding jumpers and equipment grounding conductors shall conform to provisions in §86-1.02(1)(c)ii, Electrical Systems of the State Standard Specifications.

H. Service Equipment Enclosure

1. Service equipment enclosure shall conform to the provisions in §86-1.02P(2), Electrical Systems of the State Standard Specifications and this section except that the contractor

shall pay all costs and fees required by the utility company for the connection of both temporary and permanent service.

2. The traffic signal service equipment cabinet shall be Type III 120/240-volt and shall be painted with graffiti-resistant paint to match the controller cabinet color (Seafoam Green). Battery Backup System (BBS) shall be required on all new traffic signal service equipment installation. The service cabinet shall house both TID equipment and BBS equipment including batteries.

3. The traffic signal service enclosure shall meet the requirements of TID, and shall conform to §86-1.02, Regulations and Code of the State Standard Specifications. The enclosure shall be factory pre-wired and tested to meet NEMA 3R standards. A copy of the wiring diagram for the integrated system shall be enclosed in plastic and mounted inside the enclosure. Name plates shall be provided for each control component. The name plates shall be phenolic, black background with white lettering except the main breaker, which shall be red with white lettering. All name plates shall be fastened in the enclosure by screws. Identification numerals as shown on State Standard Plan ST-14A, Standard Street Light shall be used to show the address for the meter below the meter window or the front of the enclosure.

4. The traffic signal service enclosure shall have a separate disconnect for the traffic signal, safety lighting, and sign lighting circuits. Separate disconnects shall be provided for any other separate circuit, such as street lighting or irrigation systems, when shown on the plans. Lighting contactors shall be mercury displacement type conforming to the functional and operational requirements of §86-6.07B(2), Contactor of the State Standard Specifications.

5. Painting electrical material shall conform to the provisions in §86-2.01C(11), Electrical Systems of the State Standard Specifications.

6. The contractor has the responsibility to coordinate a field meeting with representatives from TID and notify the City inspector to ascertain the exact service connection point prior to beginning work

I. Uninterruptible Power Supply (Ups) – Battery Backup System (Bbs)

1. A system for a fully functional BBS shall operate LED, incandescent or any combination of both lighting technologies for a period of at least two hours and run an additional two hours (minimum) on Red Flash only. The UPS/BBS shall have a minimum Power Rating of 2KVA (1500 Watts).

2. Individual batteries shall be 12V type and shall be easily replaced and commercially available off the shelf. Batteries shall be extreme temperature, deep cycle, sealed prismatic lead-calcium based AGM/VRLA (Absorbed Glass Mat/ Valve Regulated Lead Acid) batteries. Recharge time for the battery, from protective low cutoff to 80% or more of full battery charge capacity, shall not exceed twenty hours.

3. Maximum transfer time due power outage shall be 150 milliseconds.

4. Batteries shall be certified (by the manufacturer) to operate normally in harsh condition 25C to +74C and 20% to 95% humidity).

5. Battery output voltage shall be 110 VAC and 125 VAC, pure sine wave output, ≤ 3% THD, 60Hz ± 5Hz.

6. BBS shall bypass the utility line power whenever the utility line voltage is outside the following voltage range: 100VAC to 130 VAC (± 2 VAC).

7. BBS shall be equipped to prevent a malfunction feedback to the cabinet or from feeding back to the utility service

8. Batteries shall be provided with appropriate interconnect wiring and corrosion resistant mounting trays and/or brackets appropriate for the cabinet into which they will be installed

9. Battery interconnect wiring shall be via modular harness. Batteries shall be shipped with positive and negative terminals pre-wired with red and black cabling that terminates into a typical power-pole style connector. Harness shall be equipped with mating power-pole style connectors for batteries and a single, insulate plug-in style connection to inverter/charger unit. Harness shall allow batteries to be quickly and easily connected in any order and shall be keyed and wired to insure proper polarity and circuit configuration. Batter terminals shall be covered and insulated so as to prevent accidental shorting.

10. Batteries shall have a warranty for full replacement for two years from the date of installation.

11. The Complete UPS system including batteries shall fit inside a Type III service cabinet with the required TID equipment. The Type III service enclosure shall be specifically designed for the UPS/BBS with four batteries up to 105 ah each, as required for the specified run time, and equipped with photoelectric unit mounted inside the cabinet. The service enclosure shall be painted with graffiti-resistant paint to match the controller cabinet color. Painting electrical material shall conform to the provisions in §86-2.01C(11), Electrical Systems, of the State Standard Specifications.

12. All necessary hardware for mounting (shelf angles, rack, shelving, harness, etc.) shall be included in the bid price of the UPS.

13. UPS shall be easily installed and replaced (complete turnkey system with all necessary hardware) and shall not require any special tools for installation.

14. UPS shall include a resetable front-panel event counter display to indicate the number of times the UPS was activated and a front-panel hour meter to display, the total number of hours the unit has operated on battery power.

15. UPS inverter module shall include a serial port allowing field programmability of input/output voltage values, self-testing, communication and diagnostics. Software to retrieve data, troubleshoot and program the UPS system shall be ASCII format and be included as a part of the system.

16. The UPS shall include a display (status monitor) and/or meter to indicate current battery charge status and conditions.

17. The UPS shall have a serial port interface available to allow user programming of certain operational parameters in order to ensure compatibility with the specific intersection control equipment as deployed. The serial port interface shall be a standard RS232 serial interface (D9 connector) compatible with a PC serial comm. port and shall be mounted on the front of the UPS unit.

18. UPS Manufacturer shall provide a two year factory-repair warranty for parts and labor on the UPS. Manufacturer shall provide 24 hour technical support via toll-free telephone service.

19. UPS Manufacturer shall have field service technicians trained in Traffic Control Technology available and that can be reached via toll-free service line.

J. Controller Assemblies

1. This specification sets forth the minimum requirements for a TS-2 Type 1 controller assembly with a 16 position load bay, wired for eight phases and fully operational with all the components and plug-ins, malfunction management unit, bus interface unit, cabinet power supply, load switches, flashers and detectors including the controller unit. The controller assembly shall meet all applicable sections of the NEMA TS-2 1998 Standards, the State Standard Specifications and the State Standard Plans.

2. The controller cabinet shall be a new fully-wired Type P aluminum cabinet shall be painted powder coat (Seafoam Green), TS-2 Type 1. The cabinet shall conform to State Standard Specifications and Standard Plans. The interior of the cabinet shall be painted powder coat white. The cabinet door shall be fitted with a No. 2 Corbin lock, and stainless steel handle with a 16mm (minimum) diameter shaft and three-point latch. The lock and latch design shall not allow the handle to open the cabinet unless the lock is engaged. A locking auxiliary police door shall be included to allow limited controller function access to switch the traffic controller between normal and flash operation. The cabinet shall be “plug and play” ready with a 2070 lite controller using Apogee Version 60 NTCIP based Naztec Intersection Control Software. The cabinet layout shall be configured to provide adequate shelf space for all shelf-mounted required equipment (e.g., EVP rack, power supply, detector racks, BIU, video detection equipment, video monitor, MMU, video multiplexer, digital-optical transceiver, and controller). At least one day before the scheduled “signal turn-on”, the controller assemblies including video detection system, shall be fully wired, programmed, tested, and organized with no

unnecessary loose cables or conductors. The wiring in the cabinet shall be ty-wrapped in a neat/orderly fashion to the satisfaction of a City traffic signal technician.

3. The controller shall be a Type 2070 with Apogee Version 60 NTCIP based Naztec Intersection Control Software, and conforming to the following specifications:

California Department of Transportation's (Caltrans) specifications, and shall conform to the Transportation Electrical Equipment Specifications (TEES) dated August 2002 or newer. The controller model and manufacturer shall be registered on the Caltrans Qualified Products List (QPL). The controller shall be equipped with the following modules:

2070-1B
2070-2B
2070-2NZ
2070-3B
2070-4B (VME Cage Assembly)
2070-7A
2070-8

The 2070-1B shall be equipped with an ethernet port. The controller software operating on the 2070-1B shall be capable of utilizing the ethernet port for data transfers. The operating system shall allow the user FTP and Telnet access via the ethernet port.

The 2070 controller software shall be capable of communicating to TS-2 BIUs via SP3S on the 2070-2B. The 2070-2B shall be optically isolated.

The 2070-7A shall conform to the latest TEES specification, and shall be optically isolated. The 2070 controller software shall operate on the 2070-1B using Microware OS9 v3.2 or higher. The controller software shall be Apogee Version 60 NTCIP based Naztec Intersection Control Software.

4. The cabinet shall be supplied with one 8-position detector rack. It shall be wired such that no cabinet rewiring is necessary if expansion to 16-position is later necessary. The detector rack shall meet all applicable sections of the NEMA TS-2 standards. Detector input field panel shall have SRA-6LC surge arrestors installed for each loop input for lightning protection.

5. The loadbay shall be wired for full 8-phase operation and shall accommodate a minimum of 16 loadswitch positions. The loadbay shall also be wired for a 16-channel malfunction management unit. All field wiring terminals for vehicle phases, pedestrians, and overlap outputs shall be present on the loadbay panel. Penn-Union Corp.'s copper "Solder-less" lugs or approved equal shall be used with the terminal strips in the loadbay where more than one forked connector needs to be landed to the terminal screw on the load-bay.

6. The cabinet shall be provided with the following auxiliary equipment:

   Roll out stainless steel document drawer under the second shelf. This drawer shall have a hinged top cover, and it shall be of sufficient size and strength to hold a complete set of cabinet wiring drawings and equipment programming manuals for all modules applicable to each cabinet. When the cover is closed, the drawer shall double a resting place for documents or a laptop computer.

   Thermostatically controlled ventilation fan system per the State Standard Specifications. Fluorescent lighting fixture mounted on the inside top of the cabinet near the front edge. Police panel and technician test panel - This test panel shall be equipped with switches for each vehicle and pedestrian phases. The switch for each phase when activated shall trigger a call for the corresponding phase.

   The cabinet shall include a splice terminal block, dedicated for the interconnect cable. The number of termination channels shall match the pairs of wires for at least a 12-pair interconnect cable.

   The cabinet shall include empty shelf space to accommodate third party video detection processing units and data optical transceivers (fiber modems)

   The cabinet shall be equipped with fully wired Opticom phase selectors model M752, or approved equal. There shall be a termination panel to land Opticom interface cables from the detector units.

7. The cabinet shall be equipped with 2 Bus Interface Unit (BIU) cards for the load bays, plus 2 BIU cards for the detector racks. The BIU shall meet, as a minimum, all applicable sections of the NEMA Standards Publication TS2-1998. The BIU shall be rack-mountable and solid-state. The BIU unit shall be constructed with discrete component circuitry in order to allow repair and maintenance of the unit by use of standard tools. The BIU shall utilize machine tooled integrated circuit (IC) sockets for all IC's of 14 pins or greater, for ease of repair. One IC-BIU spare shall be provided with the cabinet. The use of BIU units utilizing surface mount technology (SMT) shall be acceptable, provided the vendor supply one spare unit for every two SMT-BIU supplied with the cabinet (i.e., if the cabinet comes with four SMT-BIUs, there shall be two spare SMT-BIUs).

8. The cabinet power supply shall meet, as a minimum, all applicable sections of the NEMA Standards Publication No. TS-2 1998

9. The loadswitches shall be solid state, meet all applicable sections of the NEMA TS-2 standards. Units shall be the dual indicating I/O type, and shall have indicator lights that show both the input and output side of the loadswitch. Units shall utilize an extruded aluminum housing with cooling fins for proper heat dissipation. Units supplied

shall be listed on the Caltrans Qualified Product List (QPL) under Model 200 Switch Packs.

10. The flasher shall meet all applicable sections of the NEMA TS-2 standards. It shall be a Type III, dual circuit rated at 15 Amperes per circuit. LED or neon output indicators shall be utilized for each circuit. Units shall utilize an extruded aluminum housing with cooling fins for proper heat dissipation. Units supplied shall be listed on the Caltrans Qualified Product List (QPL) under Model 204 flashers.

11. The flash transfer relay shall meet all applicable sections of the NEMA TS-2 standards, and t§86-4.09C(6), Heavy Duty Relays of the State Standard Specifications.

12. The number of inductive vehicle detector channels provided shall match the number of detector lead in cables shown on the plans, plus 2 additional 2-channel detector units as spares. All detectors shall be configured as a rack mounted printed circuit board for insertion into a NEMA TS-2 detector rack. Detector units shall be in full compliance with NEMA standards TS-2-1998. Detectors shall be two-channel programmable with front LCD display. Detectors shall be EDI Oracle/2, Reno A&E Model C, or approved equal.

13. The MMU shall meet all applicable sections of the NEMA Standards Publication No. TS2-1998. The MMU shall be shelf-mountable, sixteen channel solid-state with an RS-232 communications port and data cable. The MMU shall be ready to transmit event log data to the City's Streetwise ATMS Central Software via controller communications. The MMU shall log and store three report categories:

    Indications, power fluctuations, cycles missed, and power outages
    Past twenty conflicting conditions
    Event trace of the past twenty events recorded in .01-second resolution. This report is required to display conditions, which led to the conflicting condition.

    The MMU shall be a Naztec MMU-516, or approved equal.

14. All cabinet wiring shall be incorporated into one schematic drawing. Each cabinet shall be provided with three schematic drawings specific for the cabinet to be used in this specific project. Traffic signal construction plan shall also be submitted. Drawings shall indicate the intersection name and phasing. Absence of the required drawings could result in the rejection of the entire controller assembly. Cabinet testing will not proceed until_the required drawings are submitted. Operational/repair manuals for each component and plug-in shall be provided with each cabinet.

15. Prior to delivery, each controller assembly shall be tested by the supplier as a complete unit with a 2070 controller under signal load for a minimum of 24 hours. Each assembly shall be delivered with a signed checklist detailing the results of the test performed on the controller assembly. The cabinet shall be "plug and play" ready with a

2070 lite controller using Apogee Version 60 NTCIP based Naztec Intersection Control Software.

After delivery, the City will conduct a separate testing of the cabinet. If the City requires technical support during its testing period, the cabinet supplier shall provide on site technical support within 48 hours after the City makes the request.

The City of Ceres reserves the right to reject a controller assembly covered by these specifications if the assembly is found to be defective within a sixty day period after shipment or if the controller assembly fails any performance test.

16. A factory certified representative from the manufacturer shall be on-site during signal turn-on for support. The factory representative if requested by the City shall assist in having the cabinet fully operational as indicated on the intersection drawings and this specification.

    The supplier shall provide a maximum of four hours of technical training for City staff within four weeks after cabinet delivery. The training session should at least include a discussion on the differences between TS2 and TS1 cabinets, identify components unique to the TS2 cabinets, and cover the trouble shooting and testing of the TS2 controller cabinet.

17. The controller assembly including all the electronic components shall be warranted by the manufacturer against mechanical and electrical defects for a period of 1 year. The manufacturer's warranty shall be supplied in writing with each cabinet and unit within the cabinet.

    The supplier shall correct any defects in design, workmanship or material during the warranty period at no cost to the City of Ceres. All cost of labor, parts and transportation to and from the vendor shall be borne by the vendor for the duration of the warranty period. The vendor shall provide all revisions to any equipment furnished under these specifications, at no cost to the City of Ceres.

K. Modulated Signal Detection System

1. The modulated signal detection system shall be able to interface with the City's "Opticom" detection system as manufactured by 3M. The controllers shall be equipped with internal circuitry to provide programmable channels of emergency vehicle preemption. The detector shall have a minimum range of 2500 feet.

2. The modulated signal detection system shall consist of "Opticom" phase selector model M752; "Opticom" detector model 721 for 1-channel or 722 for 2-channel detection; and "Opticom" interface cable model M138, or approved equal.

3. The controller cabinets shall be wired with a "D" connector or special function cable to provide all necessary controller connections for emergency vehicle preemption. The

phase selectors or discriminators shall be wired to provide emergency vehicle preemption for the emergency vehicle phases as shown on the Drawings.

L. Internally Illuminated Street Name Signs:

1. Internally illuminated street name signs shall conform to §86-6.065, Internally Illuminated Street Name Signs of the State Standard Specifications.

2. Internally illuminated street name signs installed on signal mast arms shall be Type A.

3. The Type A internally illuminated street name sign shall consist of extruded aluminum top, bottom, and door. The door shall open from the top. It shall be held closed by three 1/4-turn airlock fasteners. The door shall have a water tight PVC gasket. The door shall have a continuous stainless steel hinge. The extruded aluminum doors shall have one side removable to gain access to the sign face.

4. Drip rails overhanging the sign face are required to help prevent water intrusion. Seams connecting the top and bottom to the ends and seams of the door frame shall be Heli-Arc welded to provide a weatherproof seal. All pop rivets and hex head indented sheet metal screws shall be stainless steel. The hinges of the sign mounting brackets shall be able to pivot in all directions.

5. Ballast shall be high output and shall be mounted inside on the bottom of the sign assembly. Sign shall be equipped with four 3/16-inch diameter drain holes located in the bottom of the housing, 2 at each end.

6. Internally illuminated street name signs shall be mounted using a plate bracket with serrated teeth for adjusting the mounting height. Mounting brackets shall be Ulti-Mate-The Big Foot, or an approved equal.

M. Signal Faces

1. Signal faces shall be in conformance with §86-2.01C(18)b, Electrical Systems of the State Standard Specifications and as shown on the approved project plans.

2. Signal section housing shall be metal type and shall have 12-inch sections. Signal housings and mounting hardware shall be painted gloss black and electrically powder coated. The backplates for mast arm mounted heads shall be ventilated. All backplates shall be such that they can be removed and reinstalled without requiring the removal of the traffic signals.

3. The second sentence in the third paragraph in §86-2.01C(18)c, Backplates of the State Standard Specifications is amended to read:

Sections shall be joined using 1) aluminum rivets and washers painted or permanently colored to match the backplate, or 2) No. 10 machine screws with washer, lock washer and nut, painted to match the backplate.

4. All vehicle signals shall be 12-inch LED indications and furnished by the contractor. This specification LED modules to be used in place of the incandescent lamp, reflector, socket, gasket, and lens assembly of the vehicle signal sections. Vehicle type LED modules shall fit in all standard, incandescent vehicle traffic signal housings. Each module shall also incorporate a printed circuit board inclusive of all of the LEDs and required circuit components, 36 inch 16 AWG wire leads with strain relief and spade terminals, a rigid housing for protection in shipping, handling and installation, and a one piece neoprene gasket. *Screw-in* type products are not allowed for vehicle signals.
5. All LED shall meet the latest ITE specifications and current State Standards and measurement criteria for LED traffic signal modules, and shall conform to the following specifications:

   LED (Light Emitting Diode) Traffic Signal Modules

   The following specification shall apply to all LED modules unless otherwise specified.

General Description

Ball type signals shall utilize the *LumiLeds* (1) light engine as their source of illumination. Lenses for ball type modules shall be made of ultraviolet stabilized polycarbonate, and incorporate facets that serve to enhance the optical efficiency of the LED traffic signal module. Individual *lens-lets* are specifically not allowed. The ball type signals shall incorporate an inner lens that is sealed to the lamp housing, and serves to collimate the light emitted by the *LumiLeds* (1) light engine. An outer lens shall also be incorporated, that serves to focus the collimated light, so as to meet ITE intensity and distribution standards. Additionally, the LED shall almost perfectly, approximate to the motorist, the appearance of an incandescent traffic signal. This means that the face of the ball LED lamp shall appear to the motorist as nearly totally uniform in illumination, and have a wide viewing angle that makes it suitable for installation on wide boulevards or single-tethered span wire. This also means that it shall not be apparent that LEDs are used as the light source for the traffic signal ball. The external lens surface for all vehicle signals shall be smooth, with no raised features, so as to minimize the collection of dirt, diesel smoke, and other particulate contaminates, and to facilitate periodic cleaning. External lens facets are not allowed. The lens shall be keyed to the housing of the LED signal module to insure the proper orientation and to avoid possible rotation during any handling. External lenses shall be hard-coated in compliance with State specifications.

The LEDs shall be mounted and soldered to a printed circuit board. The LED signal module shall be watertight when properly installed in traffic signal housing. The LED signal module shall utilize the same mounting hardware used to secure the incandescent lens and gasket assembly, and shall only require a screwdriver or standard installation tool to complete the mounting. The LED signal module assembly shall weigh less than 5 pounds. For vehicle

signals, the incandescent lamp sockets and reflectors shall be removed from the signal head housings. So as to minimize possible maintenance problems, the LED lamp module may not protrude into the signal visor area more than three-quarters of an inch in depth.

The housing of the LED signal module shall be marked 'TOP' to designate the proper orientation of the LED signal module in the traffic signal housing. The housing of red LED ball type traffic signal modules shall utilize a *partial*, *embedded and integral metal layer*, in its design and construction Manufacturers part number, date code, and electrical characteristics of the LED signal module shall be visible on the rear of the assembly. A label shall be affixed to back of the all ball type modules, that certifies their complete compliance with the latest ITE VTCSH, Part II specification for LED traffic signal modules.

The LED traffic signal manufacturer shall be ISO 9001 certified.

The light intensity and distribution from red LED signal modules shall as a minimum, meet the July, 1998 ITE VTCSH Part II, and current State standards and measurement criteria for LED traffic signal modules. Test data to verify the performance for red and green ball signals as meeting the July 1998 ITE VTCSH, Part II intensity requirements @ 74 degrees Centigrade, shall be supplied from either:

Lighting Sciences
7630 East Evans Road
Scottsdale, Arizona 85260

ETL Testing Laboratories
3933 US Route 11
Cortland, New York 13045-0950

or, other certified independent test lab. The light output of all LED vehicle signal modules shall meet ITE specifications for chromaticity.

The LEDs shall be connected in series parallel strings. No more than 1% of the total luminosity of the entire signal module may be lost in the event of a single string failure. For red LED ball type signals, the failure of a single LED shall cause loss of light from only that LED. No loss of light output from the complete module assembly shall occur as a result of a single LED failure in a red LED ball lamp.

The control circuitry shall prevent the current flow through the LEDs in the off state to avoid any false indication as may be perceived by the human eye, during daylight and *evening* hours. The LED traffic signal module shall be operationally compatible with NEMA TS - 1 and NEMA TS - 2 *conflict monitoring* parameters. The intensity of the LED signal module shall not vary by more than 10% over the allowable voltage range as specified in the electrical section below.

Red balls shall maintain required intensity, as defined by the July, 1998 ITE VTCSH, Part II intensity standards for LED traffic signal modules, over the temperature range of -40 degrees centigrade to +74 degrees centigrade, at 120 volts A.C., when new, and also after 3 years.

Power factor shall be 90% or greater, at nominal rated voltage, at 25°C, after 60 minutes of operation. Total harmonic distortion (THD) shall be less than 20% at rated voltage, at 25°C.

All LED traffic signal modules shall be in compliance with FCC noise regulations.

The red LEDs shall utilize exclusively AlInGaP technology, either AS (Absorbing Substrate) or TS (Transparent Substrate), and shall not exhibit degradation of more than 30% of their initial light intensity following accelerated life testing (operating at 85 degrees C and 85% humidity, for 1000 hours). AlGaAs technology is not acceptable.

The LED signal modules shall be connected directly to line voltage, 120 Volts AC nominal, and shall be able to operate over the voltage range of 80 VAC to 135 VAC.

The 8 inch and 12 inch red ball units shall consume no more than a nominal 7 and 10.5 watts respectively, at 120 VAC, at 25 degrees centigrade. Maximum power consumption shall not exceed 9 and 12 watts respectively, at 120 VAC, at 25 degrees centigrade.

Red arrow type LED traffic signal modules shall be temperature-compensated so as to maintain intensity at elevated temperatures. Red arrow type LED traffic signal shall be tested and documented by CalTrans as being in compliance with CalTrans intensity standards for red arrows at elevated temperatures.

Transient voltage suppression rated at 1500 watts for 1 millisecond and fusing with a maximum rating of 2 amps shall be provided to minimize the effect and repair cost of an extreme over voltage situation or other failure mode.

All LED traffic signal modules supplied shall be warranted for 5 years against manufacturing defects.

Red ball and red arrow traffic signal modules shall be performance warranted to be in compliance with July, 1998 ITE VTCSH, Part II, and CalTrans minimum intensity standards for LED traffic signal modules, at 74 degrees centigrade, for a period of three years.

N. Pedestrian Signal Heads

1. Pedestrian signal Heads shall be in conformance with §86-2.01C(19), Electrical Systems of the State Standard Specifications.

2. Pedestrian LED shall be 16” x 18” Full Hand/Fullman. The Countdown Module shall be standard for pedestrian LED signals. Alternate pedestrian LED signals shall be approved by the Engineer. The displayed messages shall be "UPRAISED HAND" and "WALKING PERSON" symbols. The unit “counts down”, or exhibits to the pedestrian a digital numerical display, as well as the Caltrans international graphic display, to communicate how much time remains to clear the intersection. The units shall have two optional operational modes; total countdown and clearance count down. The units shall be set to

clearance count down for this project. The units shall be capable of "learning" automatically the walk time interval and the pedestrian clearance intervals whenever pedestrian timing changes are made. The housing shall be die cast from a one-piece corrosion-resistant aluminum alloy. Additionally, the LED display shall almost perfectly, approximate to the pedestrian, the appearance of an incandescent pedestrian signal, or the UPRAISED HAND and WALKING PERSON symbols shall be LED filled. Outline of the symbols shall not be acceptable. The count-down display shall utilize Double LED rows.

3. The housing shall be die cast from a one-piece corrosion-resistant aluminum alloy. The housing door frame shall be hinged to the housing by stainless steel pins and hinge lugs integrally cast in the housing and door frame. Pedestrian signal housings and mounting hardware shall be painted gloss black and electrically powder coated.

O. Push Button Assemblies

1. Push button assemblies shall conform to the provisions in §86-1.02U, Electrical Systems of the State Standard Specifications and this section.

2. Pedestrian and bike push button frames shall be audible speech message that plays when the push button is actuated. The housing for a push button assembly must be made of die-cast aluminum, permanent mold-cast aluminum, or UV-stabilized self-extinguishing structural plastic. The plastic housing must have a color throughout that matches color no. 17038, 27038, or 37038 of FED-STD-595.

3. Push buttons signs shall be installed using theft-proof screws PDL, Pro-Tech't machine screws, or equal. An installation tool shall be furnished to the City by the contractor.

4. The switching unit shall be Synchronex, part No. ADA-2; or equal. The switching unit shall be a precision snap-acting type, single pole, single throw unit, pressure type terminals, and rated at 120-volt AC. The switching unit shall be UL listed. The switching unit shall be such a size as to permit recessed mounting in existing standard Type B frame without any modifications to either unit.

5. The actuator shall be conical in shape with cone extending 7/16-inch to 1/2-inch beyond the bezel of the switch housing, and shall be 2 inches in diameter.

6. 5 feet of the adjacent handicap curb ramp. Pedestrian push buttons installed on traffic signal poles located behind the sidewalk shall be within 1 1/2 feet of the back of sidewalk. If a traffic signal pole cannot meet either of the above criteria, the associated pedestrian push button shall be installed on a separate pedestrian push button post.

7. The pedestrian and bike push buttons shall comply with the Americans with Disabilities Act (ADA). In the even that a conflict exists between the ADA guidelines and City Specifications, the ADA guidelines shall take precedent.

P. Inductive Loop Detectors

1. Detectors shall conform to the provisions of §86-2.01C(22), Detectors of the State Standard Specifications and this section. Detector handholes shall be Type A. Circular loops 6 foot in diameter may be installed in lieu of 6 feet by 6 feet square loops.

2. Sensor units shall be Detector Systems Digital Loop Model 910, or equal.

3. Loop wire shall be Type 1 or Type 2. Loop detector lead-in cable shall be Type B or Type C. No more than four 6 foot by 6 foot loops shall be connected to each sensor unit. No splices are permitted in detector lead-in cables.

4. The contractor shall identify loop wires by lane number, loop number, and start/finish using tie raps and permanent marker.

5. Where detector lead-in cables are connected to the terminal strips in the controller cabinet, the pressure terminal connectors shall be soldered to the detector lead in cables.

6. Hot-melt rubberized asphalt sealant shall be used to fill slots in pavement when installing loops.

Q. Video Detectors

This section describes the requirements for providing a complete Video Detection System. Should a contractor propose a video detection system that does not completely satisfy all the listed requirements of this specification, the contractor shall clearly identify which part of the specification the product does not satisfy. The City reserves the right to approve or reject products that does not meet the specifications. The system shall be capable of providing presence vehicle detection at the intersection. The video system shall be expandable without removing or replacing existing units. The video system shall be capable of monitoring all vehicles on the roadway.

Overview

Acceptable systems include that of any manufacturer, provided such equipment meets the qualifying specifications identified herein. Using standard image sensor optics, the system shall be able to detect vehicle presence with 98% accuracy under normal conditions (days and nights).

All items and materials furnished shall be new, unused, current production models installed and operational in a user environment and shall be items currently in distribution. The detection algorithms shall have a proven record of field use at other installations for at least three years of service i.e., not including prototype field trials prior to installation.

General

These video detection specifications describe the minimum physical and functional properties of a video detection system. The system shall be capable of monitoring all vehicles on the roadway. The entire video detection system shall consist of the following:

Video Image Processing Unit

Environmentally sealed Video camera(s) with IR filter, enclosure and sunshield.
Surge suppressor

4-channel monochrome or color monitor as recommended by manufacturer for viewing the video and setting up the detection zones. A switching device and cabling shall be installed to allow viewing of up to 4 cameras on the monitor without changing cables.
All cabling and mounting hardware
All other necessary equipment for operation.

The system shall be fully compatible for installation in a NEMA type TS1 or TS2 traffic controller cabinet.

The controller cabinet shall be wired for a Video Detection System with appropriate number of cameras and cables as required in each specific project mounted according to the manufacturer's specifications for each direction of vehicular travel. The supplier of the equipment must meet the following requirements:

The Video Detection System shall be an above ground vehicle detection system that utilizes machine vision when interfaced with standard monochrome or color CCD cameras to provide complete intersection and roadway detection.

One chassis shall be supplied for the Video Detection System to provide a minimum of four camera inputs for vehicle detection. All cables shall be provided and wired in the controller cabinet. All connectors and hardware must also be supplied for the required number of camera operation.

Each Video Detection System will include, as a minimum, monochrome or color cameras for each approach requiring video detection. Camera resolution, image size, and lens angle will be determined by the manufacturer based on optimum system performance. Each camera shall include heater, sun shield and mounting brackets, and have at least twelve user programmable detection zones.

The Video Detection System shall provide quick and easy configuration and setup of detection zones at the intersection shall be done by using a standard computer mouse as pointing device, and a graphical interface built into the video processor and displayed on a video monitor.

All delay and extension functions for an approach must be performed within the processing element of the video unit. Pulse output capability must be incorporated into the supplied software; this is used for controller density timing.

The units must have a minimum capability of detecting vehicles 300 feet from the stop bars of each approach.

The video detection system shall be wired and programmed such that during fog conditions, an alternate Max Green Timing can be used.

The Video Detection System shall have remote access capability to transmit video and detector information. The Video Detection System shall have the capability to remotely reconfigure detection zones, access, logging and statistics, and transmit video via phone line, twisted pair, coaxial cable, and fiber optic interconnect via an external communication port. The manufacturer shall include separate line items in their bid indicating the cost to allow communication using a) phone line, b) twisted pair, c) coaxial cable, and d) fiber optic. The cost for these items may or may not be included depending on specific project needs.

All software and hardware, for installation, operation, and maintenance will be supplied along with necessary technical support upon setup. A minimum of 12-month technical/field support period, and updated software revisions shall be provided to the City staff at no cost. Also, training by the manufacturer shall be provided at the convenience of City staff.

The Video Detection System shall utilize standard 24 volt logic signal outputs to interface with NEMA TS1/TS2, 170/179, 2070, or 2070N controllers.

All equipment schematics and technical material used to completely service the equipment must accompany any equipment supplied to the City.

A factory representative shall be present during a) initial setup, to install cabinet equipment, provide initial setup of detection zones; and b) during the initial traffic signal turn-on to provide assistance as needed, and to ensure proper operation.

Luminaire arm installations shall be installed on the luminaire arm, with the camera/video manufacturers recommended brackets. Camera luminaire brackets shall provide adjustments for both vertical and horizontal positioning of the camera. Camera attachments shall be designed to securely fasten the camera to the luminaire arm. Signal mast arm installation shall utilize 6-feet risers. Miscellaneous hardware shall be stainless steel or galvanized steel.

The video detection system shall be warranted against manufacturing defects in materials and workmanship for a period of two years from date of installation. The video detection supplier shall provide all documentation necessary to maintain and operate the system.

The video processors shall provide a minimum of 6 separate output channels of detection for each camera.

Cabling between the cameras and controller cabinet shall accommodate video, power, zoom and focus control from the controller cabinet.

Each controller cabinet shall be equipped with a monochrome monitor for viewing the video and setting up the detection zones. A switching device and cabling shall be installed to allow viewing of up to 4 cameras on the monitor without changing cables.

Each controller cabinet shall be equipped with terminals to allow focus and zooming from the cabinet. A device to provide focus and zooming shall be provided to the City.

The Video Image Processing Unit (VIP) shall be modular by design and housed in a self-contained stand-alone enclosure or card mounted in open rack suitable for shelf mounting or 19" rack mounting inside a traffic controller cabinet.

The system shall be fully compatible for installation in NEMA TS1 or TS2 traffic controller cabinet

Ambient operating temperature shall be from –35 to +55 degrees Centigrade at 0 to 95% relative humidity non-condensing.

Surge ratings shall be set forth in the NEMA TS1 and TS2 specifications of the standard specifications.

Serial communications shall be through an RS232 serial port. This port can be used for communications to a modem or laptop to upload/download detector configurations, count data and software upgrades.

The VIP unit shall have 1 video output (RS-170 NTSC or CCIR composite video).

The camera unit shall be a high resolution, 1/4" to 1/3" image format CCD camera, designed for professional video surveillance systems. Incorporating the latest in CCD technology, the video camera shall provide detailed video without lag, image retention, or geometric distortion.

The environmental housing shall be an aluminum enclosure designed for outdoor CCD camera installations.

Installation and Training

The product supplier of the video detection system shall supervise the installation and the testing of the video equipment. A factory certified representative from the manufacturer shall be on-site during installation. The factory representative shall install, make fully operational, and test the system as indicated on the intersection drawings and this specification.

The video detection system shall be installed and programmed such that during fog conditions, an alternate Max Green Timing will be used. The Engineer will provide the alternate timing.

Necessary training shall be provided by the manufacturer as required by the contracting agency for its personnel to be proficient in the operation, setup, and maintenance of the video detection system. Instruction and materials shall be produced for a maximum of 10 persons and shall be conducted at a

location selected by the City. The City shall be responsible for travel, room and board expenses for its own personnel. Training shall be paid on a per hour basis.

Warranty

The video detection system shall be warranted against manufacturing defects in materials and workmanship for a period of two years from date of installation. The video detection supplier shall provide all documentation necessary to maintain and operate the system.

R. Lighting Sytems

1. Traffic signal lighting shall conform to the provisions in §86-2.02, Lighting Systems of the State Standard Specifications and this section.

2. The lens for all standard luminaries shall be glass or polycarbonate.

3. The luminaries on traffic signal poles shall have cut-off type lenses and Type III distribution.

4. The luminaries on standard street lights shall have photoelectric control facing north, charcoal filter, and Type III distribution, unless otherwise noted on the approved project plans.

5. Ballast for street light luminaries shall be NPF or HPF for up to 150 watts, and Autoreg for 200 watt or larger.

6. All luminaries shall have clear high pressure sodium bulbs except for Lumec Luminaries which shall have coated bulbs.

7. Luminaries for decorative street lights shall be ZED Model Z47A – 100S-120-HS-SFPH-PH8-BKTX, Lumec Model 100HPS-L23-AC3-120-SFR-HS-FN1-SFPH4-PH8/120-LMS16298A or equal, with coded bulb, photoelectric control facing north, and house side shield.

8. Pole numbers for decorative lights shall be attached to a 2.5 inch by 15 inch x 0.02 aluminum plate and mounted on the pole by use of 1/16 inch rivets.

S. Photoelectric Control

Photoelectric control shall be Type V for traffic signals and Type IV for standard street lights. Photoelectric units shall be installed inside the service cabinet.

T. Interconnect

1. The controller cabinet shall include appropriately sized terminal facilities for connection of the interconnect cable to the local controller. All required equipment and facilities for

reliable communication with the master controller shall be provided. It shall be the contractor's responsibility to establish communication between the local controllers and the central master controller unless otherwise indicated in this specification or on the plans.

2. Each controller cabinet shall contain a sufficient number of terminals of appropriate size and type to terminate and/or splice the interconnect cable.

3. Interconnect cable shall be 6 pair minimum for underground use, No. 20 twisted pairs each pair with shield and stranded tinned copper drain wire, unless otherwise shown on the plans.

4. See fiber optics specifications under Conductors and Wiring.

5. The contractor shall be responsible for maintaining existing interconnect during construction. Any interruption of interconnectivity during the construction process due to contractor activity shall be resolved by the contractor immediately and at the contractors expense.

6. Temporary interconnect splicing shall be allowed during construction for a maximum period of 60 days. Temporary splices of interconnect shall be insulated with heat-shrink tubing of the appropriate size and shall overlap the conductor insulation at least 0.6 inch. The overall cable splice shall be covered with heat-shrink tubing, with at least 1 1/2 inch of overlap of the cable jacket.

U. Data Optical Transceivers and Copper Modem

The contractor shall provide an optical transceiver (if fiber optic is utilized) or copper modem (if copper twisted pair is utilized) in the controller cabinet supporting data communications between the Traffic Operation Center (TOC) communications server and the local controller.

The copper modem shall be GDI 496 or equivalent, deployed in the controller cabinet. A copper modem shall be required at any location where interconnect cable exists. The City shall allocate copper twisted pairs as required to allow interconnection of the controller to TOC or controller to controller. The copper modems installed in the field shall be temperature hardened units with operating temperature range of 0 to 74 degrees Celsius, fully compatible with the copper modems provided by the Contractor for use in the TOC. Testing and installation shall follow the same format as the optical transceivers as applicable to a copper modem.

The optical transceiver shall be provided with four female SC type, single mode connectors compliant with the fiber drop cable. An optical transceiver shall be required at any location where fiber communication exists. All optical communications will be single mode, 1310 nm unless otherwise approved by the Engineer. The optical transceiver attached to a specific circuit will support drop and insert operations on a counter rotating, single mode fiber, optical ring. The TOC optical transceiver will be the master and support polling of the attached 2070 controller to the optical ring as commanded by the attached communication server's EIA 232 channel. The optical transceiver shall comply with the following specifications:

1. Fully compatible with optical transceivers installed at the TOC.

2. Switch selectable to function as a master or slave (field controllers will be set to slave mode).

3. Provide a 10^{-9} bit error rate performance when operating over an optical path with an identical optical transceiver with a path loss of 15 dB and operating at a data rate of 57.6 Kbps, within the field environmental conditions specified.

4. Support fault tolerant, counter rotating ring operations upon loss of an optical transceiver or cut in the fiber link with automatic fault recovery no to exceed 50 msec.

5. Receive and repeat (relaunch) the received optical signal with no greater than 1µsec delay and supporting a 15 dB link budget to the next adjacent optical transceiver interconnected to the optical ring. Also drop the signal to the attached controller with no greater than a 1 µsec delay (not including attached controller's response time).

6. Include maintenance selectable anti-streaming time out (seconds) of 1, 2, 4, 8, 16, 32, 64, 128, and disabled (not time out). The controller shall set the anti-streaming time out at a time compatible with upload of all stored timing plans and controller stored count and log information to the TOC. At the end of the selected anti-streaming time, if the controller is still transmitting, the function shall terminate communications preventing a failed controller to continuously consume the data link. It is desirable that the optical transceiver logic sense if and when the attached controller stops transmitting and automatically reset the time.

7. Provide indicators (LED or equivalent) for a maintenance technician to observe the transceiver operation including data transmission and data reception and power. The optical transceiver shall also include a fault indicator.

8. The optical transceiver shall be capable of communicating a fault to the master or the master shall be capable of sensing a failure of a slave transceiver and reporting it to the TOC Maintenance Subsystem.

9. The optical transceiver shall operate over a temperature range of –40° C to +74° C with a non-condensing humidity of 95% (relative).

10. Connectors to the controller will be DB-25 (female) or RJ-45 (female). Optical connectors (4 each; TX-1, RX-1, TX-2, RX-2) will be SC type (female). Power connectors may be as defined by the manufacturer (a power terminal strip is acceptable).

11. Optical transceiver shall be fabricated from materials treated to prevent corrosion when subjected to a field controller cabinet environment as required by Bellcore GR-2836, "Generic Requirements for Assuring Corrosion Resistance of Telecommunications Equipment in Outside Plant". Other fabrications may be approved by the City Engineer.

12. Any required power converters from 115 VAC (±10%), a single phase, 60 Hz shall be included with the optical transceiver. The power converter shall support optical transceiver operations to specifications over the specified prime power tolerances of 115 VAC ± 10% single phase. The power converter shall comply with National Electric Code.

13. The optical transceiver shall comply with National Electrical Code, as related to electronic equipment safety and grounding as well as FCC requirements for electromagnetic compatibility.

14. The optical transceiver shall be manufactured to ISO 9000 quality standards (or equivalent) and pre tested at the factory for functional performance and including burn-in electrical components to prevent failures in the field from infant mortality of components. "Burn-in" shall include procedure normally accepted by the electronics industry to provide reliable products.

15. All connectors, switches, and indicators shall be permanently marked as to identify and function. Vendor supplied documentation shall be identical to the construction of the delivered and installed product. Each optical transceiver shall include a permanently attached label with product name, model number, serial number, and name/address of the manufacturer. Each optical transceiver shall include mounting provisions to secure it in the cabinet.

16. The contractor shall supply the interconnecting EIA 232 cable from optical transceiver to controller. The contractor shall interconnect the optical transceiver power adapter to 115 VAC power within the controller and include power ground in accordance with national Electric Code. Logic ground shall be isolated from earth ground. Nylon screws shall be utilized for mounting of the optical transceiver thereby insulating the transceiver chassis from earth ground. All cables shall be permanently marked as to identification (traceable to "as-built"/installed drawings) and function. All installed cables will be properly dressed and stress relief provided as may be required.

17. The contractor shall provide all cables and connectors with protective covers to be removed only when associated cable is being connected. Any unused connector will be maintained with a protective cover.

9-4.03 EXECUTION

A. General

Traffic signal installation shall conform to Section 86, "Electrical Systems," of the State Standard Specifications and as specified herein.

B. Foundations

1. Controller cabinet foundation shall extend 18 inches above grade.

2. Foundations for decorative street lights shall be as shown on the approved project plans based on the soil engineer's recommendations or in accordance with the State Standard Plans for a Type 15 lighting standard foundation.

3. Mortar is required between the foundation and the base plate of all traffic signal and lighting standards. Mortar shall consist of one part by volume of Portland Cement and three parts of sand per State requirements.

C. Conduit

1. Conduit runs shown on the approved project plans which are to be located behind the curbs may be installed in the street, within 2 feet of and parallel to the gutter line of the curb by the trenching method specified in Section D below.

2. After conductors have been installed, the ends of conduits terminating in pull boxes and controller cabinets shall be sealed with an approved type of sealing compound.

3. All conduit bends greater than 44 degrees shall be factory bends, and shall have a minimum radius of 18 inches. Where factory bends are not used conduit shall be bent without crimping or flattening using the longest radius possible. Bending of non-metallic conduit shall be by methods recommended by the conduit manufacturer and with equipment approved for that purpose. Conduits designated for signal interconnect shall be installed satisfying the requirements of both twisted pair and fiber optic cables use (e.g., sweeps/bends for fiber optic shall be used).

4. At locations where conduit is to be installed by jacking or drilling as provided in §86-2.05C, Installation of the State Standard Specifications, and if delay to any vehicle will not exceed 2 minutes, conduit may be installed in accordance with the City of Ceres Standard Details.

D. Pull Boxes

1. Pull boxes in areas subject to traffic loads shall be installed on a concrete footing to withstand the traffic load. Tops of pull boxes shall be flush with the surrounding grade.

2. The bottom of pull boxes shall be bedded in Class 2 Permeable Material

3. Grout in the bottom of pull boxes will not be required.

4. Where the sump of an existing pull box is disturbed by the contractor's operations, the sump shall be reconstructed and if the sump was grouted, the old grout shall be removed and new grout shall be placed.

5. Recesses for suspension of ballasts will not be required.

6. Where pull boxes are to be placed in areas subject to traffic loads, a steel or cast iron cover shall be used in lieu of the concrete cover.

7. Maximum pull box spacing shall be 100 feet for traffic signals, 200 feet for street lights and hardwire signal interconnect, and 800 feet for fiber optic communications.

8. Pull boxes shall also be installed at locations where conduits branch, adjacent to the foundation for each signal standard, lighting standard, illuminated sign, controller cabinet, or service cabinet, and at the toe of slope or at the hinge point when placed on a slope.

9. Pull boxes are to be located behind the five feet sidewalks and not within the sidewalk. Where sidewalks are wider than five feet, the pull box shall be located outside of the pedestrian's general walking area such that it will not interfere with pedestrian activity. Pull boxes shall not be located within pedestrian pathways.

E. Conductors and Wiring

1. Identification bands shall be placed near the ends of termination points of all conductors. All wires shall be clearly marked inside the controller cabinet designating the appropriate signal phases.

2. When signal heads for more that one phase are mounted on the same pole, the contractor shall identify phases by tagging wires in the nearest pull box using nylon tie raps and permanent marker.

3. A 5 amp in-line fuse shall be installed on the hot leg of service in the pull box adjacent to each street light.

F. Bonding and Grounding

1. Grounding jumper shall be attached by a 3/16-inch or larger brass bolt in the signal and street light standards or controller pedestal, and shall be run to the conduit, ground rod, or bonding wire in the adjacent pull box.

2. Equipment grounding conductors will not be required in conduit containing loop lead-in cables only.

G. Uninterruptible Power Supply (UPS) – Battery Backup System (BBS)

1. The UPS-BBS system shall be wired and programmed such that when AC power is interrupted, the UPS-BBS will seamlessly enter UPS mode and provide two hours of full signal operation. If AC power has not been restored within two hours, the traffic signal shall operate in flashing red operation until failure for a minimum of two hours or until AC power is restored. When AC power is restored, the system shall seamlessly revert back to AC power without interruption to the full signal operation.

2. The USP-BBS system shall be wired and programmed to communicate with the existing 2070 controller at the intersection through the use of special function outputs, if applicable. If available, the 2070 shall communicate with the TOC through the use of the special alarm functions to return BBS activation and other information to the TOC.

H. Controller Cabinet Assembly

1. Interconnect cable splices in the controller cabinet and connections of the appropriate cable pairs to the controller shall be done by the controller supplier at turn-on. Interconnect cable shall be run continuously without splices between controller cabinets. Splices shall not be made in the pull boxes. Splices shall only be made in the controller cabinets on the terminal blocks provided for that purpose by the controller manufacturer. It shall be the contractor's responsibility to establish communication between local controllers and the central master controller unless otherwise indicated.

2. The base of the controller cabinet shall be sealed with a silicon caulking material.

I. Functional Testing

1. In order to properly conduct functional testing of the controller assembly, schematic drawings specific for the cabinet to be used in this specific project shall be submitted with the cabinet. Traffic signal construction plan shall also be submitted. Drawings shall indicate the intersection name and phasing. Absence of the required drawings could result to the rejection of the entire controller assembly. Cabinet testing will not proceed until the required drawings are submitted. The functional test for each signal system shall consist of not less than 14 days. If unsatisfactory performance of the system develops, the conditions shall be corrected and the test shall be repeated until the 14 days of continuous satisfactory operations is obtained.

2. Controller and cabinets shall be delivered to the City of Ceres as directed by the City Engineer for pre-testing no later than 45 days prior to installation. After completion of functional testing by the City the contractor shall pick up and install the equipment at the work site.

3. Before scheduling the traffic signal "Turn On," the contractor is required to coordinate a pre-testing to be conducted by the City's Signal Maintenance Department. Seventy-two hours minimum advance notice is required to schedule this pre-test. During the pre-test, the City's traffic signal maintenance staff will determine if all components of the traffic signal system are operational as designed, including the Battery Backup System and video detection system. If deficiencies are found then the contractor shall make the necessary corrections and schedule a follow up pre-testing. Only after all the deficiencies found are corrected can the contractor schedule the signal "Turn On." The contractor shall provide a minimum of forty-eight hours advance notice to schedule the "Turn On".

9-4.04 MEASUREMENT AND PAYMENT

The contract lump sum price per intersection for signals, poles, equipment, mast arms, foundations, conduit, wires, pull boxes, lighting, signs, sensing loops and/or cameras and other associated equipment and materials as shown on the approved project plans, complete with labor.

CHAPTER - 10

IRRIGATION & LANDSCAPE

IRRIGATION SYSTEMS

10-1.01 GENERAL

A. Requirements

1. The contractor shall furnish all materials, equipment and labor necessary to complete all irrigation systems and related work as shown on the approved project plans and as specified herein.

2. The approved project plans will indicate the general arrangement of piping and equipment, but may not indicate all offsets, fittings and accessories that may be required. The contractor shall furnish any incidental materials and labor required for the irrigation system.

3. Work covered in this section

   a. selection of irrigation system materials and accessories.

   b. installation of an irrigation system with electronic controllers

   c. system test to ensure compliance with all applicable codes, standards and recommendations

   d. establishing and setting run-times for each station on the irrigation controller.

B. Reference Specifications Codes and Standards

1. Federal Specifications and Standards

   NEC National Electric Code
   AASHTO American Association of State Highway and Transportation Officials

2. State of California Standard Specifications
   § 20-2 Irrigation
3. Commercial Standards

ASTM D 1785 Specification for Polyvinyl chloride (PVC) Plastic Pipe, Schedule 40, 80, 120

ASTM D 2241 Specification for Polyvinyl chloride (PVC) Pressure-Rated Pipe (SDR Series)

ASTM D 1785 Specification for Polyvinyl chloride (PVC) Plastic Pipe, Schedule 40, 80, 120

ASTM D 2241 Specification for Polyvinyl chloride (PVC) Pressure-Rated Pipe (SDR Series)

ASTM D 2462 Specification for Threaded Polyvinyl chloride (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D 2466 Specification for Polyvinyl chloride (PVC) Plastic Pipe Fittings, Schedule 40

ASTM D 2467 Specification for Polyvinyl chloride (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D 2564 Specification for Solvent Cements for Polyvinyl chloride (PVC) Plastic Piping Systems

ASTM D 2737 Standard Specification for Polyethylene Plastic Tubing

ASTM D 2855 Standard Practice for Making Solvent Cement Joints of Polyvinyl chloride (PVC) Plastic Pipe and Fittings.

ASTM F 656 Specifications for Primers for Use in Solvent Cement Joints of Polyvinyl chloride (PVC) Plastic Pipe and Fittings.

UL Underwriters' Laboratories, Inc.

NSF National Sanitation Foundation (nsf.org)

C. Contractor Submittals

1. Submittals shall be provided by the contractor as required by this section.

2. The contractor shall retain all manufacturer documentation and warranty information accompanying the installed equipment. The documentation and warranty information shall be submitted to the City Engineer upon request, but no later than the installation date.

3. If the contractor proposes to substitute the materials, products, or manufacturers' explicitly listed in these specifications then a list of the proposed substitutions along with the corresponding manufacturer documentation and warranty information shall be submitted to the City Engineer at least thirty days before beginning work. Substitute materials will be acceptable only if the contractor demonstrates that the substitutions are equal to the specified products. An equal product must be:

   a. consistent in quality and features when compared to the specified

   b. the product must be compatible with the City's existing system and inventory of replacement parts, and

   c. the product must have the same or better manufacturer's warranty.

   Upon request by the City Engineer, but not later than the date of the final review, the contractor shall submit to the City Engineer a complete set of "As-Built" approved project plans which accurately depict all changes noted on the job-site plan set. The approved project plans shall be submitted on reproducible mylar or sepia prints made from the original planting and irrigation plans. The contractor shall also submit one complete reduced set of record irrigation plans printed on 11-inch by 17-inch white paper.

D. Quality Assurance

1. The contractor shall schedule all reviews by the City Engineer of the irrigation installation and system testing at least forty-eight hours (two working days) prior to the anticipated review.

2. The contractor shall request a review by the City Engineer at the following points in the progress of the irrigation system installation:

   a. Before backfilling any segment of pipe, swing joint, valve, electrical conduit/conductor, grade level enclosure, or other irrigation system component, the City Engineer shall review the parts and their assembly to assure conformance with the approved project plans

   b. After backfilling the main-line pipe and all appurtenant valves, the contractor shall demonstrate that the main-line is pressure-tight by performing the following hydrostatic test:

      After thoroughly flushing the pipe network, the contractor shall slowly fill the system with water. All air shall be purged from the system before all remote control valves are closed. All in-line isolation valves shall be open during the hydrostatic test, unless otherwise authorized by the City Engineer. The hydrostatic test shall consist of charging the system to a static gauge pressure of 125 pounds per square inch (psi). The system shall be capable of maintaining the

static pressure with not more than a 5 psi loss for a period not less than 1 hour, or as otherwise directed by the City Engineer. If leaks appear during the test then the leaks shall be repaired, and the flushing and hydrostatic test shall be repeated.

c. After the planting is complete, and after the sprinklers and other irrigation components are installed, the City Engineer shall review the irrigation system for leaks, for performance, and for conformance with the approved project plans. The contractor shall demonstrate that the irrigation system functions properly and provides complete coverage in all planting areas. Leaks shall be promptly repaired. For areas with rotors or spray heads, the system shall provide head-to-head coverage. Any deficiencies discovered by the City Engineer shall be promptly corrected.

d. For review during the plant establishment period see "Landscape and Irrigation Maintenance" of these specifications.

E. Quality Control

1. The contractor shall comply with all applicable federal, state, and City regulations.

2. The contractor shall be responsible for hazards created in the public right-of-way or damage to private property caused by leaks, overspray, or other problems associated with the irrigation system during its installation and throughout the plant establishment period.

3. The contractor shall protect excavations during the irrigation system installation. Soil shall not be stockpiled in an area which may impede the safe passage of pedestrians or vehicles.

4. The contractor shall maintain one complete set of the irrigation plans at the job-site. In the event any portion of the work is not installed as indicated on the plans, the changes shall be noted and drafted onto the job-site plan set. The contractor shall make neat, legible annotations daily as the work progresses, showing all changes including the exact location, size and type of equipment installed. The job-site plan set shall be available at all times for review by the City Engineer.

5. The contractor shall be responsible for damage to the irrigation system which occurs before or during the plant establishment period.

10-1.02 MATERIALS

A. All irrigation system components shall be new and without flaws or defects.

B. Centralized Irrigation System

1. Controller: The standard centralized irrigation system shall be the Rainmaster® Evolution™ DX2 Central Control System, or an approved equal. An equal product must support two-way remote communication, and must be upgraded to interface either by radio, or by hardwired connection with the Rainmaster® Evolution™ DX2 Central Control System computer terminal used by the City. The Controller shall have enough stations to control all valves indicated on the approved project plans including those designated for future extension, plus a minimum of two spare stations.

2. The cabinet for the centralized irrigation system controller and components shall be a vandal and weather-resistant stainless steel pedestal cabinet with an integral locking mechanism. The cabinet shall fully enclose all controller components, accessories and terminal connections. The contractor shall provide one of the following cabinets:

   a. V.I.T. Products, Inc., Strong Box® Model SB-16SS.

   b. Rainmaster® Evolution™ stainless steel pedestal enclosure

   c. an approved equal.

3. The centralized irrigation system controller shall be equipped with the following communication accessories capable of remote data transmitted with the Rainmaster® Evolution™ DX2 Central Control System:

   a. For radio communication, the controller unit shall be specified with an integral radio communication circuit board (Rainmaster® DX-RF). A compatible accessory antenna shall be provided to transmit the remote data to the base receiver at the City of Ceres Maintenance Service Center. The contractor shall provide the appropriate antenna as follows:

1. For line of the sight radio communication, provide a low-profile dome antenna mounted on the side of the controller cabinet, as shown on the approved project plans. The dome antenna shall be a Rainmaster® EV-ANT-FD, or an approved equal.

2. For non-line of sight radio communication, provide a high-gain antenna installed as shown on the approved project plans. The high-gain antenna shall be a Rainmaster® EV-ANT-F, or an approved equal. If clear reception cannot be established using the high-gain antenna alone then the contractor shall install a Rainmaster® EV-RF-RPTR Remote Network Repeater Station at an appropriate off-site location in the public right-of-way or landscape easement area.

3. The standard remote control shall be a Rainmaster® PROMAXR, or an approved equal, receiver unit mounted permanently inside the controller cabinet. The contractor shall also permanently mount a Rainmaster® PROMAXR, or approved equal, antenna on the controller cabinet for communication between the receiver unit and the City's remote transmitter.

4. The standard master control valve shall be Superior 3100.2100 series brass valve, or an approved equal, installed as shown on the approved project plans.

5. The standard flow sensor shall be Rainmaster® EV-FM, or an approved equal, installed as shown on the approved project plans. The electrical cable used to connect the flow sensor to the controller shall be a Rainmaster® EV-CAB-COMM, or an approved equal.

C. Standard Controller

1. The standard irrigation controller for use where a centralized irrigation system controller is not required shall be a Superior, Sterling Series Controller with integral lightning/surge protection, or an approved equal. The controller shall have enough stations to control all valves indicated on the approved project plans including those designated for future extensions, plus a minimum of two spare stations. The controller shall be equipped with a DC-1 cable installed to connect to the remote sidekick unit.

2. The cabinet for the standard irrigation controller and components shall be a vandal-and weather-resistant, stainless steel pedestal cabinet with integral locking mechanism. The cabinet shall fully enclose all controller components, accessories, and terminal connections. For irrigation system which utilize reclaimed water, an adhesive-backed sticker with purple background and white letters shall be placed on the cabinet door which reads "Non-potable water – Do not drink" printed in English and in Spanish. The contractor shall provide one of the following cabinets:

   a. V.I.T. Products, Inc., Strong Box® Model SB-18SS with a PED-18SS pedestal

   b. an approved equal.

D. Electrical Components

1. All electrical components shall be UL listed, and installed according to NEC, PG&E, and City regulations, and in accordance with the manufacturer's recommendations.

2. Electrical Service

   a. The raceway of electrical conduits for the electrical service between the service point of connection and the controller shall conform to §86, Electrical Systems of the State Standard Specifications except that the minimum conduit size shall be ¾-inches in diameter.

   b. All electrical service conductors shall be copper AWG size 10 or larger, Type TW or THW, with a temperature rating of 60°C, unless otherwise noted on the approved project plans. Wire splices shall only occur in approved grade level enclosures with UL listed water-proof connectors, or in a weather-tight junction box inside the controller cabinet.

c. The electrical receptacle installed inside the controller cabinet shall have ground fault circuit interrupter (GFCI) protection.

3. Low Voltage Control Circuits

a. All low voltage control circuit conductors shall be copper AWG size 14 Type UF, or larger. The common wire for the low voltage circuit shall be AWG size 12 or larger wire which extends parallel to the entire length of common wire as a spare and coil an extra 24 inches of the wire into each remote control valve box. The insulation jacket color for each wire shall be as follows:

1. control wires (+) shall be red

2. common wire (-) shall be white

3. spare wire shall be any color other than red, black, or white.

b. Low voltage wire splices shall be assembled using a 3M Direct Bury Splice Kit, or an approved equal. The 3M DBY kit shall be used for up to two AWG size 12 wires. The 3M DBR kit shall be used for up to three AWG size 10 wires. Wire splices shall only occur in grade level enclosures. If an intermediate splice is required then the contractor shall locate the splice inside a grade level enclosure, as described in the "Grade Level Enclosure" section of this specification.

E. Water Meters and Backfill Flow Prevention Devices

1. Water meters for irrigation systems shall be provided in accordance with the City requirements. Irrigation equipment shall be connected to a water meter installed exclusively for landscaping. No portion of the irrigation system may be connected to a water meter used for domestic use. The irrigation systems for median island landscaping shall be connected to a water meter provided exclusively for the median island.

2. Backflow prevention assemblies for irrigation systems shall be provided and installed in accordance with the requirements of the Public Works Department.

F. Valves

1. The standard remote control valves shall be a Rain Bird® EFB-C series brass valve, or approved equal. If the design flow rate is less than 10 gallons per minute then the standard remote control calve shall be a Rain Bird® PEB series glass-filled nylon valve, or approved equal. If the design flow rate is less than 3 gallons per minute, or for all drip irrigation systems, then the contractor shall provide a Rain Bird® PEB series valve and an upstream Rain Bird® RBY series in line wye filter with 200-mesh replaceable filter, or an approved equal. For drip systems without pressure-compensating emitters,

the contractor shall also provide Rain Bird® EFB-CP-PRS-B pressure reducing valve, or an approved equal.

2. The standard non-potable, quick-coupling valve shall be a Rain Bird® 44NP series valve with locking purple rubber cover, or an approved equal.

3. The standard ball valve shall be a KB® (King Brothers Industries) WLT series PVC low-torque valve, or approved equal. For remote control valve or main-line isolation valve installations, the contractor may use a ball valve with integral union to eliminate the required threaded coupling and separate union shown on the approved project plans.

G. Rotors, Spray Heads, and Tree Bubblers

1. The standard rotor shall be a Hunter® 120 series sprinkler with integral check valve, a Hunter® PGP series sprinkler with integral check valve, a Rain Bird® Falcon™ series sprinkler with integral check valve, or an approved equal. The CONTRACTOR shall install nozzles with the appropriate radius, arc, and trajectory for each application. The City Engineer may require a change in nozzles if the change improves water distribution and coverage.

2. The standard spray head shall be a Rain Bird® 1800-SAM series sprinkler with integral check valve, a Hunter® SRS series sprinkler with field-installed Hunter® HCV check valve or approved equal. Spray heads shall be specified with the appropriate pop-up height, radius, arc, and trajectory for each application. The City Engineer may require a change in pop-up height or nozzles if the change improves water distribution or coverage. For irrigation systems which use non-potable water, all spray heads shall be equipped with Rain Bird® 1800 NP, or an approved equal, plastic snap-on covers which read “Do not drink” printed in English and in Spanish.

3. The standard tree bubbler shall be a Rain Bird® 1400 series pressure-compensating full-circle bubbler, or an approved equal. The contractor shall provide bubblers with the appropriate trickle for each application.

4. Riser-mounted impact heads shall not be allowed for ornamental landscaped areas without approval of the City Engineer.

H. Drip Irrigation Components

1. The standard drip emitter shall be a Rain Bird® Xeri-Bird™ XBD series, XEri-Bug™ XBT series, or an approved equal, multi-outlets pressure-compensating emission device.

2. The distribution tubing shall be continuous ¼ inch diameter flexible vinyl tubing designed for use with the specified drip emitters.

3. The standard distribution tubing stake shall be a Rain Bird® DBC series diffuser bug cap, or an approved equal.

4. The standard distribution tubing shall be a Rain Bird® TS series plastic stake, or an approved equal.

5. On the downstream side of the remote control valve or in-line pressure regulator, the contractor shall provide a pressure gauge. The pressure gauge case and window shall be manufactured of polycarbonate resin. The gauge shall be 1-1½ inches in diameter, shall be calibrated from 0-60 pounds per square inch in 2-pound increment and shall have a black aluminum pointer.

I. Other Proprietary Irrigation Components or Systems

1. With the approval of the City Engineer, the irrigation system may be designed using proprietary irrigation components in lieu of the products specified and shown on the approved project plans. The contractor has the responsibility to demonstrate that the proprietary component or system functions as well as or as better than a system designed using specified products.

2. If a system utilizing proprietary components is approved for use by the City Engineer then the plans shall include all applicable installation details and specifications published by the manufacturer. The contractor shall submit manufacturer documentation and warranty information to the City Engineer prior to installation.

J. Grade Level Enclosures

1. The standard grade-level enclosure for irrigation valves located outside of hardsurfaced areas shall be a Carson-Brooks green plastic enclosure with a bolt-down lid, or an approved equal.

a. For standard remote control valves, the contractor shall provide a rectangle box sized to accommodate all valve components, but not smaller than a Carson-Brooks Model 1419-12.

b. For standard quick-coupling valves and standard ball valves in remote control valve assemblies, the contractor shall provide a circular box not smaller than Carson-Brooks Model 910.

c. For standard ball valves, the CONTRACTOR shall provide a rectangular box sized to allow easy access to the shut-off lever, but not smaller than a Carson-Brooks Model 1419-12.

2. The standard grade-level enclosure for drip emitters shall be a Rain Bird® SEB-6X, or an approved equal, plastic circular enclosure designed to accommodate the specified emitter.

3. The standard grade-level enclosure for intermediate wire splices located outside of hardsurfaced areas shall be a circular box not smaller than a Carson-Brooks Model 910, or an approved equal.

4. If the City Engineer authorizes a grade level enclosure within a hard scaped area then the contractor shall provide a precast concrete utility box manufactured by Christy, Associated Concrete. The lid for the precast concrete utility box shall support any expected loading condition and shall have a text which reads, "Irrigation."

5. The 6 –inch layer of Class 2 permeable material shown on the approved project plans to be placed in the bottom of each grade level exposure, shall be the material defined in the "Utility Earthwork" section of these specifications.

K. Pipes, Sleeves and Fittings

1. The standard irrigation pipe material shall be Class 12454-B PVC pipe conforming to ASTM D1784. All pipe material shall be NSF listed, except pipe used for systems which use non-potable water. The standard pipe segment length shall be 20 feet. The standard pipe design shall be as follows:

   a. For ½ -inch to 2 –inch nominal pipe diameter, the contractor shall provide solvent-weld Schedule 40 or threaded Schedule 80 PVC 1120 conforming to ASTM D 1785.

   b. For 2½ -inch to 4 –inch nominal pipe diameter, the contractor shall provide IPS size SDR 13.5 315 PSI PVC 1120 conforming to ASTM D 2241.

   c. For nominal pipe diameters greater than 4-inch, the contractor shall provide AWWA C900 pipe.

2. Each length of pipe shall be marked with the nominal diameter in inches, the Schedule or SDR designation, the ASTM D 1784 cell classification and the manufacturer's name and code.

3. If a pipe segment must pass beneath a hard-scaped area then the contractor shall encapsulate the pipe in a Schedule 40 PVC sleeve which is at least two pipe sizes larger than the enclosed pipe and shall install a color coded warning tape placed over the sleeve.

4. All solvent-weld PVC pipe settings shall conform to ASTM D 2466 for Schedule 40 slip fittings.

5. All threaded PVC pipe fittings shall conform to ASTM D 2464 for Schedule 80 threaded fittings. Flex Risers shall be manufactured from a corded rubber hose material permanently fastened to Schedule 80 threaded male adapters on each end.

6. All irrigation mains shall be continuously marked in conformance with the appropriate ASTM Piping Identification Systems requirements.

L. Solvent cements and Pipe Thread Compounds

1. All solvent-weld PVC Pice material and slip fittings shall be joined using a solvent cement conforming to ASTM D 2564. The contractor shall use a regular-bodies cement to join pipes with nominal diameters from ½-inch to 2 –inches, and a medium-bodies cement to join pipes larger than 2 –inches. All solvent-weld pipes which will serve as main-lines, or for those pipes with nominal diameters larger than 2 –inches, the contractor shall first apply a primer conforming to ASTM F 656 before applying the cement.

2. All threaded PVC pipe material and fittings shall be assembled using a pipe thread compound or Teflon tape designed to provide a leak-proof pressure-tight seal by filling voids between threads.

M. Backfill

1. Irrigation trenches which run through planting areas shall be backfilled using Native Material as defined in these specifications.

2. The sand backfill indicated on the approved project plans for irrigation mainline and electrical trenches shall conform to Sand as defined in these specifications

3. For irrigation pipes which extend in sleeves through hard-scaped areas, the trenches shall be backfilled in conformance with these specifications.

10-1.03 EXECUTION

A. General

1. All irrigation system components shall be installed in accordance with the approved project plans, with the manufacturer's recommendations, and with industry standards.

B. Point of Connection

1. Before beginning work on the irrigation system installation, the contractor shall locate all points of connection, both for the water supply, and for the electrical service to the controller. The points-of connection shall conform to the following requirements:

a. All irrigation piping must be connected to a metered water service installed exclusively for landscaping purposes, and in accordance with standards established by the City of Ceres Water Division. The Contractor shall install a backflow prevention device immediately downstream of the meter.

b. The point of connection to the electrical to the electrical system must be acceptable to the Turlock Irrigation District and the City Engineer. The contractor shall adhere to all regulations established by TID when connecting the controller to the secondary electrical service.

2. If work on either the water service or electrical service point-of-connection requires an existing service to be shut-off then the contractor shall coordinate the shut-off with the City Engineer. At no time shall the period of the shut-off extend more than 24 hours, unless specifically authorized by the City Engineer. If a shut-off of more than 24-hours is authorized then the contractor shall provide irrigation water by some other means to all affected plants, even if the areas are being maintained by CITY staff. Watering shall be performed as often as necessary to maintain healthy plant growth throughout the duration of the shut-off.

C. Verifying Water Pressure

1. After locating the water service points of connection, the contractor shall determine if the water pressure at this point is within 5 pounds per square inch (psi) of the design pressure indicated on the approved project plans. If the pressure is more than 5 psi higher or lower than the design pressure then the contractor shall notify the City Engineer of this finding.

2. At the City Engineer's discretion, amendments to the irrigation design may be required to account for the measured water pressure. No work shall proceed until the City Engineer has determined that the design pressure and actual pressure are acceptable.

D. Sleeves beneath Hard-scape

1. Irrigation pipes and controller wires which pass beneath hard-scaped areas or through concrete or mansonry walls/foundations shall be placed inside sleeves. The ends of each sleeve shall extend a minimum of 12 inches beyond the limit of the hard-scaping.

2. All sleeves shall have a color codes warning tape placed over the sleeve in accordance with the provisions of the Pipe Identification Systems section. The contractor shall stamp an "I" on the face if the curb above the location of the sleeve.

3. Sleeve and the required warning tape above each sleeve must be installed before any hardsurfacing or bedding materials are installed. Boring beneath hardsurfacing to install sleeves after the hardsurfacing materials are placed is not allowed.

4. Sleeves shall be installed without bends or angled fittings to allow for future removal and replacement of the contained pipe wire.

E. System Layout

1. The controller shall be located so that, when viewed from the road, it may be obscured by plants and where accessibility for maintenance and programming is not obstructed.

Controllers shall not be located in median islands. The controller shall not obstruct a driver's line-of-sight.

2. For Centralized irrigation systems, the following criteria apply:

   a. For systems using radio communication, the antenna shall be located so that optimum reception is achieved. The receiver shall be installed at the City of Ceres Composition Yard located at 2220 Hackett Road in Ceres, California. If clear reception cannot be achieved then the contractor shall either install a remote network repeater station, or provide hardwired or telephone communication.

   b. If a high-gain antenna is used then the antenna and controller shall be positioned so that the length transmission cable (which extends between the two components) does not exceed the maximum length of cable available from the manufacturer.

3. The flow sensor and master control valve shall be located not more than 2,000 feet from the controller, with the flow sensor located upstream of the master control valve.

4. The backflow prevention assembly, if required, shall be installed in a location where the insulated above-ground assembly enclosure does not obstruct a driver's line-of-sight.

5. Irrigation pipes and control wiring shall be placed in planting areas. The contractor's layout shall minimize the length of pipe or control wire passing beneath hard-scaping. For clarity, the plans may show the mainlines or laterals schematically (e.g.; superimposed over sidewalks or streets) rather than in the proposed location. In such cases, the pipes shall be placed in the nearest appropriate unsurfaced area or planting bed.

6. The contractor shall locate the remote control valve and other mainline valve enclosures within planting areas. Valve enclosures shall not be installed in hard-scaped areas.

F. Trenching

1. Trenches for irrigation pipes, fittings, and electrical conduits shall be free of jagged rubble, large rocks, or other sharp objects which may adversely effect underground facilities.

2. Trenches for irrigation piping shall be of sufficient width to accommodate pipe laid in a serpentine alignment.

3. Where trenching for new irrigation facilities is performed in areas planted with existing trees, shrubs, or other significant landscape features, the trenching alignment shall be adjusted as necessary to avoid damage to the root systems of these existing features. If the trenching will pass through areas which contain existing groundcover plantings or turf then all disturbed areas shall be restored to their original condition after backfill.

4. If an existing irrigation facility or other underground utility or structure is damaged, broken, or severed during the trenching operation then the contractor shall repair the facility to a standard equal to or better than the original construction.

G. Installation Irrigation Pipes and Control Wires

1. Irrigation pipes shall be installed according to the following criteria:

a. Before assembly, all pipes shall be stored with the ends of the pipe wrapped, or with the pipe segments elevated above the ground surface to keep dirt and other debris out of the pipe.

b. If the pipe is brittle or sun-bleached when delivered to the site then it shall not be used.

c. Parallel pipes may be placed in a common trench, provided that a minimum horizontal clearance of 3 –inches is maintained between the buried pipes. Pipe shall not be install parallel to and directly over another pipe.

d. At pipe crossings, the crossing angle shall be approximately perpendicular, but not less than 45 degrees. A minimum of 3 inches of vertical clearance shall be maintained between crossing pipes. If a change in pipe elevation is necessary at crossing to maintain the required vertical clearance then the change shall be accomplished using an offset constructed of 45 degrees fittings.

e. All pipe shall be cut straight and true. After cutting, the cut end shall be reamed to the inside diameter of the pipe and all burrs shall be removed.

f. All irrigation pipes shall be installed in a serpentine alignment to allow for thermal expansion and contraction.

g. Mainline pipes with rubber gasket joints shall be installed in accordance with the "PVC Pressure Pipe" section of these specifications. Concrete thrust blocks shall be used at every change in pipe direction.

2. Irrigation fittings shall be installed according to the following criteria:

a. All solvent-weld PVC pipe shall be assembled in accordance with ASTM D 2855, "Standard Practice for Making Solvent-Cemented Joints with Polyvinyl chloride (PVC) Pipe and Fittings." The contractor shall use a regular-bodied solvent cement to join pipes with nominal diameters from ½ inch to 2 inches, and a medium-bodied cement to join pipes larger than 2 inches. In addition, for all solvent-weld pipes which will serve as main-lines, or for those pipes with nominal diameters larger than 2 inches, the contractor shall first apply a primer to the fitting and end of pipe before applying the cement and assembling the joint.

b. All threaded PVC pipe shall be assembled using pipe thread compound or Teflon tape, except that Teflon tape shall not be applied to the threads which will receiv the spray head, rotor, or emitter. If Teflon tape is used then no more than three wraps shall be applied to each fitting.

3. Control wires shall be installed according to the following criteria:

a. Control wires shall only be spliced inside grade level enclosures. Splices shall be assembled using a water-proof manufactured wire splice system in accordance with the manufacturer's instructions.

b. When possible, the contractor shall install wiring in the same trench as the irrigation mainline.

c. Each bundle of control wires to be buried shall be gathered and taped at an interval not exceeding 10 feet. The bundle shall be taped to the top of the irrigation mainline. Standard electrical tape shall be used to bundle the wires and to affix the bundle to the irrigation main.

d. All low-voltage control wires shall have a 24 inch length of excess wire coiled inside each remote control valve enclosure.

e. The contractor shall install one spare control wire which extends parallel to the entire length of common wire. The insulation jacket color for the spare shall be any color other than red, black, or white.

H. Installing Valves and Grade-level Enclosures

1. Master control valves shall be installed downstream of, and as close as possible to, the backflow prevention device, or to the water meter for systems which require no backflow prevention device. The irrigation main-line between the meter and the master control valve shall not have intermediate branch connections installed which could allow flow to bypass the master control valve.

2. Remote control valves shall be installed according to the following criteria:

a. Only one remote control valve assembly shall be installed inside each grade level enclosure.

b. The size of the remote control valve shall match the line-size of the irrigation pipe which it controls. All accessory components and fittings show on the Approved project plans as integral parts of the remote control valve assembly shall be the same line-size as the valve.

c. Each valve assembly shall have unions installed on both ends to allow for future removal of the assembly for maintenance or replacement, as show on the approved project plans.

d. The bottom of the remote control valve assembly shall be supported by Class 2 permeable material placed inside the grade-level enclosure.

3. Quick coupling valves shall be installed so that their spacing throughout the planting area is less than 200 feet.

4. Ball valves shall be installed according to the following criteria:

a. Ball valves shall be installed at intervals that are less than 500 feet along the length of each irrigation mainline, and at the upstream end of each mainline which passes beneath hard surfaced area inside a sleeve.

b. If an irrigation mainline will be extended to serve a future landscaped area then the mainline shall terminate with a line-size ball valve installed inside a grade-level enclosure.

c. Line size ball valves shall be installed on both sides of sleeve before the irrigation main line passes through any sleeve passing under the street.

5. Grade level enclosures shall be installed according to the following criteria:

a. Plastic grade level enclosures shall not be located within 12 inches (measured at the top) from the edge of any hard surfacing material, building, wall header board, or structure. When two or more enclosures are installed side by side, the contractor shall provide at least 12 inches of separation between each enclosure.

b. The lid for each plastic grade level enclosure shall be identified by permanently inscribing the following information:

1. station number and controller designation (multiple controllers only) for remote control valves

2. MV for master control valves

3. FS for flow sensors

4. BV for ball valves

5. QC for quick coupling valves

6. SB for wire splices.

c. If a precast concrete grade level enclosure is used to enclose irrigation or electrical components then the lid shall be set flush with the surrounding hardsurfacing material, and shall be designed to support any expected loading condition. The lid shall have text which reads "Irrigation."

I. Assembling Risers, rotors, spray heads, bubblers, and emitters

1. Before any risers, heads, or emitters are installed, the contractor shall thoroughly flush the entire main-line pipe network with clean water and then perform hydrostatic tests as described in this section. Risers or heads shall not be installed until the City Engineer is satisfied that the mainline is adequately flushed and pressure tight.

2. Rotors and Spray Heads shall be installed according to the following criteria:

a. The riser assemblies for all rotors and spray heads shall be installed with triple swing joints as shown on the approved project plans. The triple swing assemblies shall allow for both horizontal and vertical adjustment of each head without leaking.

b. The heads shall be positioned such that the spray from head reaches the closest surrounding head, thus providing "head-to-head" coverage. The contractor shall make adjustments or add additional heads, if necessary, to achieve head-to-head coverage in all areas irrigated by rotors or spray heads.

c. Rotors and spray heads shall be placed not closer than 3 –inches from the edge of a handsurfacing material, wall, or foundation to allow access for edging equipment.

d. All heads shall be set perpendicular to the finish grade, including those in sloping areas. The trajectory of each head shall be adjusted by selecting an appropriate pop-up height and nozzle trajectory rather than by tilting the head.

e. Heads shall be set flush with the finish grade elevation of the mowed surface for the turf areas, or set slightly above the finish grade elevation in groundcover or mulch areas, per the manufacturer's recommendations.

3. Bubblers shall be installed according to the following criteria:

a. Tree bubblers shall operate on a separate dedicated controller station to allow the bubblers to function even when other stations are shut-off. This will allow the valves for shrubs, groundcover, and/or turf to be shut-off during drought conditions without compromising the survival of the trees.

b. Each bubbler shall be installed within the limits of the plant pit.

c. For street trees along the frontage of a private residential, commercial, or industrial parcel, the bubbler shall be connected to and controlled by the private on-site irrigation system.

4 . Emitters shall be installed according to the following criteria:

a. Emitters and associated accessories shall be installed as shown on the approved project plans and in accordance with the manufacturer's recommendations.

b. The end of each emitter tube with insect plug shall be positioned at the edge of the root ball to encourage peripheral root growth.

J. Backfill

1. Trench backfill shall be placed in accordance with City of Ceres requirements

2. The contractor shall not compacting or consolidate the soil within the drip-line of trees.

3. If trench settlement occurs within the landscaped area then the contractor shall determine the cause of the settlement to the satisfaction of the City Engineer. The contractor shall place and compact additional backfill material, or remove and replace the backfill, as conditions warrant, until the proposed grade is met.

K. Installing and Programming the Controller

1. Controller Installation

a. The controller shall be installed as shown on the approved project plans and in accordance with the manufacturer's recommendations and instructions.

b. All communication and electrical service wires shall be installed inside UL listed Schedule 40 conduit.

c. For the controller's electrical service connection, the contractor shall install a 5 amp inline fuse on the hot leg of the service, in accordance with the §86, Signals, Lighting and Electrical Systems of the State Standard Specifications. The fuse shall be located inside a precast concrete grade level enclosure with a valid marked "Irrigation." The grade level enclosure for the fuse shall be positioned adjacent to the secondary splice box designated by TID as the point-of connection. The service conductors shall run inside a conduit from the grade level enclosure to the controller cabinet (direct burial wire is not allowed).

d. If the distance between the grade level enclosure and the controller cabinet exceeds 250-feet then the contractor shall install intermediate grade level enclosures to accommodate wire splices for the electrical service conductors at a spacing that is less than 250 feet.

e. If a centralized irrigation system controller with radio communication capability is used then the contractor shall work with the City to determine an antenna location

which results in clear radio reception between the antenna and the base receiver. Components shall not be permanently installed until this determination is made.

f. The contractor shall connect the low-voltage control wires to the controller in a sequential arrangement according to the station numbers shown on the approved project plans.

2. Controller Programming

a. The contractor shall use the irrigation schedule provided on the approved project plans when programming the controller. Run-times and frequency of watering for each station shall be programmed according to appropriate evapotranspiration rates for each amount within the Ceres area.

b. The total amount of water applied to the landscaped area shall not exceed the Maximum Applied Water Allowance, as calculated by the irrigation designer. A landscape irrigation audit may be required in accordance with the State of California Landscape Management Program if the monthly water usage exceeds the maximum applied water allowance by 20%.

c. The controller shall be programmed to operate all stations during non-daylight hours

L. Operating the System

1. When complete, the irrigation system shall deliver water at a rate which is compatible with the plant materials and with the infiltration rate of the soil. The system shall be adjusted by the contractor to eliminate overspray or runoff during normal operation. Repeat cycles shall be programmed if the runoff problems cannot be corrected by other adjustments.

2. The contractor shall establish accounts with all applicable utility companies to provide services for the irrigation system. The City Engineer will assign addresses for all services upon request of the contractor. The accounts shall be paid by the contractor until completion of the Plant Establishment Period.

10-1.04 MEASUREMENT AND PAYMENT

The work performed under these specifications shall be measured by the unit or lump sum as designated in the contract item for constructing an irrigation system.

If measured by unit then the quantities of sprinkler heads, quick coupling valves, backflow prevention devices, etc. will be determined from actual count of the items in place in the completed work. Quantities of conduit and the various sizes of pipe will be measured by the lineal foot in place in the completed work.

Payment will be made at the lump sum or unit price for sprinklers, sprinkler heads, bubbler heads, quick coupling valves, backflow prevention devices, control valves, control assemblies, or turning unions and the contract prices per linear foot for the various sizes and types of pipe. Full compensation for furnishing

and installing swing joints and pipe used for risers shall be considered as included in the price paid for the contract item requiring the riser or swing joint and riser and separate payment shall not be made.
When there are not any separate contract items for spray nozzles, valve protectors, valve boxes or any other materials necessary to complete the irrigation system, the materials shall be furnished and installed. Full compensation for this work and materials shall be considered as included in the prices paid for the various contract items of the irrigation system and separate payment shall not be made.

The above prices and payments shall include full compensation for furnishing all labor, materials tools, equipment, and incidentals, and for doing all the work involved in installing the irrigation systems, complete in place, as shown on the approved project plans, in accordance with these specifications and as directed by the City Engineer.

LANDSCAPE GRADING

10-2.01 GENERAL

A. Requirements

1. The contractor shall furnish all materials, equipment, and labor necessary to complete all landscape grading and related work as shown on the approved project plans and as specified herein.

2. Work covered in this section:

   a. establishing finish grades and contours in landscape areas

   b. protecting existing trees and vegetation

   c. protecting landscape slopes from erosion.

B. Reference specifications, codes, and standards

ASTM D 1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 pound hammer and 18 inch drop

ASTM D 2992 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3017 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

C. Contractor submittals

1. The contractor shall submit certification from a licensed arborist if landscape grading will be performed in areas where trees or plants exist which are scheduled to remain as part of the landscaping design.

2. The contractor shall submit copies of the recommendations prepared by the certified Arborist to the City Engineer prior to performing any work.

3. The contractor shall submit manufacturer product information for the erosion control netting to be used on 3:1 or steeper slopes.

4. See §10-3 “Landscape Soil Preparation” of these specifications for the submittal requirements related to the landscape compatibility/horticultural report.

D. Quality Assurance

1. All compaction testing will be performed by a testing laboratory of the City's choice and at the City's expense, unless otherwise noted.

2. Where soil material is required to be compacted to a percentage of relative compaction, the maximum density at optimum moisture content will be determined in conformance with ASTM D 1557. Field density in-place and moisture content tests may be performed in conformance with ASTM D 2992 and ASTM D 3017, respectively, or by other means acceptable to the City Engineer.

3. If the tested materials show non-compliance with the required relative compaction then the contractor shall rework the fill to the extent required to achieve the specified compaction.

4. The City will pay the cost of the first test and one re-test. Subsequent re-testing after the first retest to show compliance shall be at the contractor's expense.

E. Quality Control

1. The contractor shall notify Underground Service Alert (USA) and all affected utility companies before performing grading or excavation work in areas which contain existing underground utilities. The utilities marked by each service provider shall be protected by the contractor during the grading or excavation work, or repaired at the contractor's expense.

2. The contractor is responsible to repair damage to public or private property which occurs as a result of the landscape grading.

3. Subgrades and finished grades for the landscaped areas may vary within a tolerance or one-tenth of a foot from the finished grade elevations shown on the plans, provided no drainage pockets or depressions result.

4. All bench marks, monuments, and other reference points set by a licensed land surveyor for the benefit of the contractor shall be carefully protected during grading operations. If these markers are disturbed or removed prematurely then they shall be replaced as directed by the City Engineer and at the contractor's sole expense.

5. All landscape grading work performed in and around areas with existing trees or other plants shall be performed in accordance with the recommendations of a licensed arborist.

6. If the contractor, while performing the landscape grading work, endangers the survival of an existing designated tree or other significant landscape feature which is scheduled to remain, then, as directed by the City Engineer, the contractor shall mitigate the damage.

a. If, in the opinion of the City Engineer, the death of the tree or other landscape feature is likely, then the contractor shall completely remove the feature.

b. If a tree is removed then the minimum tree replacement ratio shall be two-to-one for a replacement tree of equivalent size, character, and species.

7. For grading during the rainy season the contractor shall install and maintain erosion and sediment control measures, as regulated by the Regional Water Quality Control Board, to prevent sediment-laden storm runoff from discharging into the public storm drain system. The erosion control measures shall remain in place during the rainy season, or until all landscaping improvements are installed and accepted by the City.

8. The contractor shall mitigate dust to the maximum extent practicable while grading so as not to create a nuisance. The contractor shall adhere to air quality regulations promulgated by the San Joaquin Valley Air Pollution Control District.

10-2.02 MATERIALS

A Suitable Fill Material

1. Native fill material, including strippings, shall be free of refuse, clay, hard dirt clods, stones larger than 1-1/2 inches in size, and roots larger than ¾ inch in diameter. The strippings shall be free of boron greater than 1 part-per-million (ppm), noxious weeds, Bermuda grass, nut grass, or other invasive wildland pests.

2. Import shall conform to the requirements of §19, Earthwork of the State Standard Specifications. Prior to the replacement of import, the City Engineer shall be notified of the source of materials. The contractor has the responsibility to demonstrate the suitability of all import for landscape plantings. If required by the City Engineer, a landscape compatibility/horticultural report shall be submitted.

3. Top-soil shall conform to the requirements of Section 10-3 “Landscape Soil Preparation” of these specifications.

4. Earthwork quantity data listed on the plans is for the contractor’s convenience only. All grading shall conform to the contours, lines and grades shown on the plans. If any discrepancies arise between the listed quantities and the plans then the plans govern.

10-2.03 EXECUTION

A. Site Clearing, Grubbing, and Stripping

1. The area to be landscaped shall be cleared, grubbed, and stripped in conformance with the §10-3 “Site Preparation” of these specifications and §19 “Earthwork” of the State Standard Specifications.

2. Existing vegetation which is not classified as noxious or as an invasive pest shall be incorporated into the soil to a depth of 8 inches by discing in perpendicular directions. Where the height of the growth interferes with proper discing, the growth shall be cut and the cuttings removed and properly disposed of.

B. Preservation of Trees

1. See §7-3 "Protection of Trees During Construction" of the City of Ceres Standard Specifications.

C. Preparation for Fill Material

1. Before placing any fill material, the contractor shall verify that all landscape areas to receive fill have a firm, unyielding surface. Saturated soils shall be either removed and replaced, or ripped, air-dried, and recompacted.

2. The contractor shall remove and legally dispose of any soil within the planting areas which has been contaminated with cement, petroleum products, or other chemicals or substances.

3. All excess soil and spoils, including native material deemed unsuitable by the City Engineer, shall be removed from the site and properly disposed of.

D. Placement and Compaction of Fill

1. Grading equipment shall be suitable for the work to be done and shall be kept in a serviceable condition. Equipment operators and workmen shall be skilled in grading operations and shall be supervised by a competent superintendent.

2. All landscape grading, including the establishment of subgrade elevations for landscape handsurfacing, shall be controlled by grade stakes to achieve the slopes, contours, and finished grade elevations shown on the plans.

3. All landscape areas shall be moisture-conditioned and brought up to grade in lifts that do not exceed 8 inches in uncompacted thickness. The final lift shall be topsoil which conforms to Section 10-3 "Landscape Soil Preparation" of these specifications.

4. The City Engineer may perform compaction tests on each layer of fill to assure adequate compaction throughout the landscape area. If the compaction is not satisfactory then the contractor shall recompact each deficient area necessary to achieve the compaction requirements specified on the approved project plans.

   a. For all lifts except the final top-soil, the density shall be not less than 90 percent relative compaction as determined by ASTM D 1557.

b. The final 8 inch topsoil lift shall be compacted to between 80-85 percent relative compaction.

5. Fill shall not be placed during weather conditions which will alter the moisture content of the fill materials sufficiently to make adequate compaction improbable. After placing operations have been stopped because of adverse weather conditions, no additional fill material shall be placed until the last year compacted conforms to the required compaction.

E. Finish Grading and Protection of Slopes

1. After all hard-scaping features, utility vaults and splice boxes, and other improvements within the landscaped areas are installed, the surfaces of earth mounds and planting areas shall be graded and shaped by blading, dragging, and other appropriate means. Finished surfaces shall be uniform and true to the slopes and grades indicated on the approved project plans. Finish grade of planting areas shall conform to the following criteria:

a. All areas shall slope away from the foundations of any building, sound wall, retaining wall, bridge abutment, pier footing or other structure within or contiguous to the landscaped area. The slopes shall be in accordance with the recommendations of the project soils engineer and applicable codes. All areas shall also slope away from the crown of any existing tree.

b. The final contours shall not obstruct natural storm runoff, unless a surface swale or underground storm drain system is provided. These storm drain features shall be designed by a registered civil engineer.

c. All rill and gully erosion scars shall be repaired to the satisfaction of the City Engineer.

d. All angular grade transitions shall be rounded off, including the tops and the toes of slopes.

e. To accommodate the mulch or sod, the soil grade shall be set either 3 inches for mulch, or 1 inch for sod, below the surface of sidewalks, curbs, handsurfaced areas, header boards, utility vaults or splice boxes, or other features within or contiguous to the landscaped areas.

The finish grade after the mulch or sod is installed shall then be flush with the hardscape features or utility enclosures.

f. All cut or fill shall be flush with the adjoining grade in a firm, unyielding position with no visible grade differential.

g. For slopes adjacent to sidewalks, the toe of slope shall be located no closer that 3 feet from the back edge of the sidewalk. The area between the toe of slope and the sidewalk shall have a slope that is between 2% and 5%.

3. All slopes in landscape areas shall be graded to conform to the following criteria:

   a. The maximum allowable slope in groundcover/shrub areas is 3:1 (3 horizontal to 1 vertical), unless otherwise approved by the City Engineer.

   b. The maximum allowable slope in turf areas is 4:1 (4 horizontal to 1 vertical).

   c. The maximum allowable slope in groundcover/shrub or turf is 2% (50 horizontal to 1 vertical).

   d. The maximum allowable slope in hard-scaping areas is 2% (50 horizontal to 1 vertical).

   e. All landscaped areas shall slope away from building foundations, or other similar structures, at a minimum allowable slope of 5%.

4. After fill material has been placed and compacted to the satisfaction of the City Engineer, all sloping landscape areas shall be roughened before planting takes place. Surface roughening can be accomplished in one of the following ways.

   a. Trackwalking can be performed by driving a bulldozer or other track-mounted tractor up and down perpendicular to the slope. The tractor will leave pattern of tread imprints parallel to the slope contours.

   b. A serrated wing blade attached to the side of a bulldozer can be used to roughen small cut and fill slopes. A depth between 2 inches and 4 inches shall be loosened if this method is employed.

   c. Roughening can be accomplished using hand tools such as picks or rakes, provided a loosened depth between 2 inches and 4 inches is achieved throughout.

5. For 3-1 or steeper slopes, an erosion control netting made from woven coir or jute fiber twine shall be installed over the entire sloped area to stabilize the surface and protect against erosion. The edges of each net shall be anchored to the ground surface as recommended by the manufacturer. For slopes subject to high-velocity storm runoff, a product designed specifically for this use shall be employed, as approved by the City Engineer.

6. At the completion of grading work, the site shall be left in a clean and finished condition conforming to the approved project plans.

10-2.04 MEASUREMENT AND PAYMENT

Landscape grading shall be measured for payment by the cubic yard of excavation and backfill. Payment shall be made at the contract bid price and shall include the furnishing of all labor, materials, water, tools, and equipment required to construct and complete soil preparation, grading, excavation, backfill, and compaction in accordance with the approved project plans, these specifications and as directed by the City Engineer.

LANDSCAPE SOIL PREPARATION

10-3.01 GENERAL

A. Requirements

1. The contractor shall furnish all materials, equipment, and labor necessary to complete all landscape soil preparation and related work as shown on the approved project plans and as specified herein.

2. Work covered in this section:

a. sampling and analyzing soil for landscape compatibility and horticultural properties

b. placing top-soil.

c. using fertilizers and herbicides.

B. Reference Specifications, Codes and Standards

1. OSHA Standards

C. Contractor Submittals

1. The landscape compatibility report shall be prepared by a soil testing laboratory with a minimum of three years experience performing analyzes for ornamental landscaping.

2. The landscape compatibility analysis shall conform to the following:

a. The landscape compatibility report shall be submitted to the City Engineer concurrently with the landscaping plans for the project, and shall be accompanied by a statement from the project landscape architect that the proposed plant list is in accordance with the report.

b. The results of the horticultural analysis shall be presented in a report which shall include recommendations for soil, fertilization, drainage, plant materials, and other measures to ensure a successful landscape design. The depth of the water table, if known, shall be included in the report.

c. A minimum of two representative soil samples shall be analyzed for landscaped areas with less than 100,000 square feet. Additional tests will be required according to the following criteria:

1. For areas larger than 100,000 square feet, one additional sample shall be analyzed for each additional 50,000 square feet of landscaped area.

2. If the total length of the landscaped area, measured longitudinally, exceeds 2,500 linear feet (e.g.; for median strips or backing lot treatments) then one representative composite sample shall be analyzed per 2,500 linear feet.

3. For multiple, discontinuous landscaped areas within one project, one representative composite sample shall be analyzed for each distinct area, if the areas are separately by more than 2,500 feet.

4. If different soil textures or color are discovered while sampling then a sample from each soil type shall be analyzed.

5. Analyze one representative sample for every 3,000 cubic yards of import.

d. Each composite sample shall be a mixture of 10 or more sub-samples taken from the rooting dept of the proposed plantings. Typical rooting depths are as follows:

1. Turf and herbaceous groundcovers: 0 to 60 inches

2. Shrubs: 0 to 18 inches

3. Trees: 0 to 36 inches

e. Additional samples shall be analyzed if different soil textures or colors are exposed during mass grading operations.

f. Samples shall not contain any plant or organic material from the soil surface.

g. Samples should be gathered with a tube which removes a core of soil from the surface to the lower rooting depths. If a shovel is used then a vertical 1 inch wide slice should be taken from the side of the hole.

h. Each soil sample shall be analyzed to determine its soil chemistry including all of the following:

1. alkalinity or acidity (pH)

2. fertility

3. landscape compatibility`

4. soil classification and practice size

5. percolation or infiltration rate

6. boron content

7. salinity including electrical conductivity and sodium absorption ratio

8. calcareous or chlorosis condition

9. organics

i. For landscaped and hard-surfacing areas, the contractor shall submit a pre-emergent herbicide for approval by the project landscape architect.

3. The contractor shall submit to the City Engineer a written certification stating the quality, type, composition, weight, and origin of all amendments and chemicals delivered to the site for soil preparation work.

D. Stockpiled Material

1. Landscaping areas shall not store materials with a weight that will consolidate the soil. If landscape soil is consolidated by stockpiles materials then the soil shall be scarified and compacted in accordance with the approved project plans.

E. Quality Assurance

1. The contractor shall maintain records to verify the ordering and delivery of specified quantities and types of material. The records shall be available to the City Engineer.

10-3.02 MATERIALS

A. Topsoil

1. An 8 inch layer of clean topsoil shall be provided in all planting areas. Topsoil shall consist of a fertile, friable soil. The soil shall be free of refuse, heavy or stiff clay, hard dirt clods, stones larger than 1-1/2 inches in any dimension, roots larger than ½ inch in diameter, litter, and other deleterious materials. In addition, the soil shall be free of noxious weeds, Bermuda grass, nut grass or other invasive wildland pest plant material, toxic amounts of boron, acid or alkaline chemicals, and shall be capable of sustaining healthy plant life.

2. Site strippings may be stockpiled and may be used as topsoil, provided the material conforms to these specifications.

3. If import topsoil is used then it shall be certified by the project landscape architect to be physically and chemically appropriate for sustaining plant life, and for mixing with the underlying native soil.

B. Soil Amendments

1. The contractor shall amend the topsoil in accordance with the recommendations of the landscape compatibility report, and as specified on the approved project plans. If the plant are in conflict with the landscape compatibility report then the report shall govern.

2. The contractor is encouraged to use recycled products as soil amendments. Recycled products include, but are not limited to, composted yard debris and rice hulls.

3. The contractor shall submit a certification describing the quantity, type, composition, weight, and origin of all amendments. Amendments shall not be delivered to the site without the approval of the City Engineer.

4. Submittals of composted materials must include certification that manufacturing procedures involve temperatures and detention times which effectively inactivate weed seeds and other deleterious organisms or materials.

5. Rice hull compost shall not contain living vegetation, dirt or other objectionable material, pathogenic viruses, fly larvae, insecticides, herbicides, fungicides or poisonous chemicals that would inhibit plant growth.

C. Commercial Fertilizer

1. All fertilizers shall be commercially processed and shall conform to the requirements of the agricultural laws and regulations applicable in the State of California.

2. The contractor shall adhere to the recommendations of the horticultural report and of the manufacturer when selecting the fertilizer for each landscape area.

3. The fertilizer shall be a long-term, slow-release, water-insoluble, nitrogen-based product.

4. The fertilizer shall be in pelleted, granular, or tablet form and shall have the chemical composition clearly marked on the packaging material for inspection by the City Engineer. The packaging must list the relative amounts of the three major macro-nutrients-nitrogen (N), phosphorus (P), and potassium (K) as percentages of the total weight. If other macro-nutrients (e.g. magnesium, sulfur, calcium) or micro-nutrients (e.g chlorine, iron, boron, manganese) are included in a fertilizer, these must also be listed on the packaging. The fertilizer packaging must also indicate whether the product is “fast-release” or “slow-release.”

D. Pre-Emergent Herbicides

1. Unless otherwise specified on the plans, a broad spectrum pre-emergent herbicide shall be used. The herbicide must be registered for use in the State of California. Care shall be taken in selecting the appropriate pre-emergent herbicide because the effectiveness of these products is determined by site-specific conditions.

10-3.03 EXECUTION

A. Clearing

1. All landscape areas shall be cleared and graded in accordance with these specifications.

2. In areas to be planted, remove and properly dispose of all rocks and paving materials over 1-1/2 inch in any dimension, and all weeds, debris, and other deleterious or noxious material.

B. Soil Preparation

1. If in-place soils are to be amended to create the topsoil layer then the in-place soils within the areas to be planted shall be cross-ripped and scarified to a minimum depth of 8-inches prior to the addition of amendments and fertilizers.

2. If import soil is used for topsoil then the underlying sub-soil shall be scarified to a minimum depth of 8-inches before topsoil is placed. The import shall be mixed with the site soil so that there is a gradual change from site soil to top soil.

3. Following the ripping and scarifying operation, all areas to be planted shall be tilled. Amendments and fertilizers shall be uniformly distributed in the topsoil.

4. The contractor shall use the soil amendments and/or commercial fertilizer in the landscape compatibility/horticultural report or as shown on the approved project plans. The contractor shall adhere to all agricultural laws and regulations applicable and the manufacturer's safety recommendations when using agricultural chemicals.

5. The tilling operation shall be performed until the ripped and scarified soil is in a loose condition and the amendments and fertilizers are thoroughly mixed.

6. The outer limits of areas to be cultivated shall extend a minimum of 12-inches beyond the outer row of plants requiring cultivation, unless otherwise stated on the approved project plans.

7. The use of rubber tired equipment will be permitted for cultivating operations provided the equipment used will eradicate compaction caused by the tires. Rubber tied equipment will not be allowed on cultivated areas after cultivation.

8. Grading work shall not be performed when the moisture content of the soil is such that excessive compaction will occur, or when the soil is so dry that clods will not break readily or dust will form.

C. Pesticide/Herbicide Application

1. Apply pre-emergent herbicide in accordance with the manufacturer's recommendations for all tree ring, ground cover, and shrub bed areas. The contractor shall adhere to all agricultural laws and regulations and the manufacturer's safety recommendations when using agricultural chemicals.

2. The pre-emergent herbicide shall be applied before mulch is placed.

3. The contractor shall use care in applying the pre-emergent herbicide to avoid damaging any existing trees or other landscape features scheduled to remain. Herbicides shall not be applied during windy conditions. Windy conditions are defined as winds that are greater than 1 Bft (Beaufort Wind Scale Speed). A 1 Bft is equivalent to wind speed that varies between 1 and 3 miles per hour. At this speed rising smoke will drift and wind vanes remain inactive; small ripples may appear on the surface of calm water. When viewing a typical flag the flag will only occasionally flip open and the upper outer corner hangs significantly lower than the upper inner corner.

10-3.04 MEASUREMENT AND PAYMENT

Payment for soil preparation shall be included in the contract bid price for landscape grading.

CHAPTER - 11

PARK FACILITIES

PLAY STRUCTURES

11-1.01 GENERAL

A. Scope of Work

1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all play structures and related work as shown on the approved project plans and as specified herein.

2. The general extent of the work is shown on the approved project plans and includes, but is not necessarily limited to, miscellaneous play structures.

B. Shop Drawings

The contractor shall submit detailed erection drawing and a schedule of materials to the City Engineer for each model. Drawings shall include all data necessary for assembly, including recommended erection sequence. To facilitate assembly, each manufactured member shall be stenciled with an easily recognizable identification number keyed to the erection drawings. All components shall be unitized and packaged by model number, ready for assembly.

C. Handling and Storage of Materials

Materials to be stored shall be placed above ground upon platforms, skids, or other supports. Materials shall be protected from dirt, grease, and other foreign matter and shall be drained and protected from corrosion. If members have been cleaned and painted prior to erection then they shall be stored so that they are protected from the weather.

D. Quality Assurance

The contractor shall provide certification that all required accessible playground structures have been installed in compliance with §15-6 of the ADA Accessibility Guidelines.

11-1.02 MATERIALS

A. Play equipment as specified on the approved project plans.

B. All materials shall be structurally sound and suitable for safe play. All edges shall be ground smooth, and deburred. All finishes shall be according to the manufacturer's specifications.

C. Power Coated Metal Finish: All metal parts, other than those galvanized, stainless, and nonferrous composition shall be finished with a powder coating applied to a minimum thickness of 5 mils. Lead-containing epoxy and powder are not acceptable.

D. Product Warranty

1. The specified playground equipment manufacturer shall provide documentation that the furnished playground equipment is in conformance with the most current editions of the United States Consumer Product Safety Commission handbook for public Playground Safety and the ASTM Standard Consumer Safety Performance Specification for Public Use (designation F 1487-95).

2. The manufacturer shall provide the City with a 10 year warranty for non-moving parts and structural component against structural failure and manufacturing defects. In addition, the manufacturing shall provide a one year warranty for all moving parts, including but not limited to, swing chains, swing seats, trolleys, spring assemblies and rocking equipment against failure due to deterioration or manufacturing defects.

3. The manufacturer shall provide the City with valid documentation demonstrating that the play equipment manufacturing process and ASTM safety standards have been certified by the following:

a. International organization for Standardization (ISO), for conformance to ISO 9000 Standards.

b. International Playground Equipment Manufacturers Association (IPEMA), demonstrating compliance with the most current ASTM safety standards.

11-1.03 EXECUTION

A. All workmanship shall be in accordance with best practice, accurately measured and laid out, carefully and precisely executed.

B. All work shall be plumb, level, and true to alignments called for and shown in the shop drawings.

11-1.04 MEASUREMENT AND PAYMENT

The Play Structures shall be measured and payment made at the contract lump sum or unit price and shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and for doing all work as shown on the approved project plans and in accordance with these specifications and as directed by the City Engineer.

SITE FURNITURE

11-2.01 GENERAL

A. Scope of Work

1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all play structures and related work as shown on the approved project plans and as specified herein.

2. The general extent of the work is shown on the approved project plans.

B. General

Site furniture and equipment shall be as shown on the approved project plans.

C. Handling and Storage of Materials

Materials to be stored shall be placed above ground upon platforms, skids, or other supports. Materials shall be protected from dirt, grease, and other foreign matter and shall be drained and protected from corrosion. If members have been cleaned and painted prior to erection then they shall be stored so that they are protected from the weather.

11-2.02 MATERIALS

A. Drinking fountains shall be as specified on the approved project plans.

B. Park benches shall be pre-cast concrete as manufactured by Outdoor Creations, or an approved equal.

C. Picnic tables shall be pre-cast concrete as manufactured by Outdoor Creations, or an approved equal.

D. Bicycle racks shall be as specified on the approved project plans.

E. Trash receptacles and recycle receptacle shall be as specified on the approved project plans.

F. Bollards shall be as specified on the approved project plans.

G. Barbeques shall be as specified on the approved project plans.

11-2.03 EXECUTION

A. Install ADA accessible drinking fountains with concrete pads per the manufacturer's instructions. Install drainage lines per these specification. Connect fountains to potable water per the California Plumbing Code.

B. Install park benches with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

C. Install picnic tables with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

D. Install bicycle racks with concrete pads as shown on the approved project plans and in accordance with the manufacturer's recommendations.

E. Install trash and recycle receptacles with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

F. Install bollards with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

G. Install barbeques as shown on the approved project plans and in accordance with the manufacturer's recommendations.

H. Install tree grates as shown on the approved project plans and in accordance with the manufacturer's recommendations.

I. Install park signs as shown on the approved project plans and in accordance with the manufacturer's recommendations.

11-2.04 MEASUREMENT AND PAYMENT

The Site Furniture shall be measured and payment made at the contract lump sum or unit price and shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and for doing all work as shown on the approved project plans, in accordance with these specifications and as directed by the City Engineer.

SPORTS EQUIPMENT

11-3.01 GENERAL

A. Scope of Work

1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all sports equipment and related work as shown on the approved project plans and as specified herein.

2. The general extent of the work is shown on the approved project plans.

B. General

Sports equipment shall be shown on the drawings.

C. Handling and Storage of Materials

Materials to be stored shall be placed above ground upon platforms, skids, or other supports. Materials shall be protected from dirt, grease, and other foreign matter and shall be drained and protected from corrosion. If members have been cleaned and painted prior to erection then they shall be stored so that they are protected from the weather.

11-3.02 MATERIALS

A. Basketball Goals and Standards shall be by Allsport Model No. 1523-13, No. 45 and No. FT-11 or approved an equal.

B. Volleyball Net Posts and Nets shall be by Blue Mountain Indian Recreation Products Model No. 62-25-0056 or approved an equal.

C. Tennis Court Net Posts shall be by PW Athletic, Model No. 2205, Tennis Court Net by PW Athletic, Model No. 8352 or an approved equal.

D. Tennis Court Net Anchors shall be by PW Athletic, Model No. 8371-20 and #8371-30 or an approved equal.

E. Tennis Court Benches shall be by General Seating Company, Model No. PN103-B-25' length or an approved equal.

F. Tennis Court Windscreens shall be by Har-Tru Durascreen or an approved equal.

G. Pitcher's Mound shall be an official little league step down Rubber Macgregor Mode No. BBPRPROY or an approved equal.

H. Home plates shall be as specified on the approved project plans.

I. Base anchors shall be as specified on the approved project plans.

J. Soccer goals shall be as specified on the approved project plans.

11-3.03 EXECUTION

A. Install basketball standards and backbones with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

B. Install volleyball net post and net with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

C. Install tennis net post and net with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

D. Install tennis court net anchors as per the manufacturer's recommendations.

E. Install tennis court benches with concrete footings as shown on the approved project plans and in accordance with the manufacturer's recommendations.

F. Install tennis court windscreen as as shown on the approved project plans and in accordance with the manufacturer's recommendations.

G. Install pitcher's mound rubber step downs as per the manufacturer's recommendations.

H. Install Home Plates as per the manufacturer's recommendations.

I. Install Base Anchors as per the manufacturer's recommendations.

J. Install Soccer Goals as per the manufacturer's recommendations.

11-3.04 MEASUREMENT AND PAYMENT

The sports equipment shall be measured and payment made at the contract lump sum or unit price and shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and for doing all work as shown on the approved project plans, in accordance with these specifications and as directed by the City Engineer.

TRAIL PAVEMENT-DECOMPOSED GRANITE

11-4 .01 GENERAL

A. Scope of Work

1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all decomposed granite paving and related work as shown on the approved project plans and as specified herein.

2. The general extent of the work is shown on the approved project plans.

11-4.02 MATERIALS

A. Base shall be aggregate base to conform to "Streets" of the City of Ceres Standard Specifications.

B. Quarry fines shall consist of decomposed granite or other approved materials free of adope, vegetable matter, loam, and other deleterious substances, be of such quality as to compact thoroughly to form a firm walking surface with a minimum of dusting or scuffing.

C. Color shall be as shown on the approved project plans on the Finish Schedule. The contractor shall submit color samples for City approval.

D. Edges, if not otherwise shown on the approved project plans, shall be bound with headers as specified in "Streets" of the City of Ceres Standard Specifications.

E. Soil Stabilizer: Organic stabilizer powder as manufacturing by Stabilizer, Inc., 1522 North 35th Street, Phoenix, Arizona 85008, (602) 225-5900, or an approved equal.

11-4.03 EXECUTION

A. Excavate and compact subgrade as detailed and specified in the grading section.

B. Install headers as shown on the approved project plans and as specified in "Streets" of the City of Ceres Standard Specifications.

C. Spread and compact four inch aggregate base as outlined in Section 26-1.02A, Class 1, Class 2 and Class 3 Aggregate Subbases of the State Standard Specifications.

D. The next step shall be in this order:

1. One ton of quarry waste fines shall be pre-mixed with 10 pounds of stabilizer.

2. Spread stabilizer mix in final lift over compacted base lift.

3. Apply water until moisture penetrates final depth of quarry fines.

4. After surface water disappears and quarry fines is still moist, roll with a heavy roller. Allow area to dry before use.

5. Placement, spreading and compaction is accordance with the provisions of Section 25-1.04, Spreading of the State Standard Specifications.

E. Wet and roll to provide evenly gravely appearance and a firm walking surface with minimum of dusting and scuffing. Slope surface to drain with no areas which will tend to collect water. All areas shall be swept free of loose rock and/or gravel.

11-4.04 MEASUREMENT AND PAYMENT

The Trail Pavement shall be measured and payment made at the contract lump sum or unit price and shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and for doing all work including base, edges, and stabilizer as shown on the approved project plans, in accordance with these specifications and as directed by the City Engineer.

TRAIL PAVEMENT-ASPHALT CONCRETE

11-5.01 GENERAL

A. Scope of Work

1. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all asphalt concrete paving and related work as shown on the approved project plans and as specified herein.

2. The general extent of the work is shown on the approved project plans.

11-5.02 MATERIALS

A. Base shall be aggregate base to conform to "Streets" of the City of Ceres Standard Specifications

B. Asphalt concrete to conform to these specifications for residential streets.

C. Edges, if not otherwise shown on the approved project plans shall be bound with headers as specified in "Streets" of the City of Ceres Standard Specifications.

D. Organic stabilizer powder as manufacturing by Stabilizer, Inc., 1522 North 35th Street, Phoenix, Arizona 85008, (602) 225-5900, or an approved equal.

11-5.03 EXECUTION

A. Excavate and compact subgrade as detailed and specified in the "Grading" of the City of Ceres Standard Specifications.

B. Install headers as shown on the approved project plans and as specified in "Streets" of the City of Ceres Standard Specifications.

C. Spread and compact four inch aggregate base as outlined in Section 26-1.02A, Class 1, Class 2 and Class 3 Aggregate Subbases of the State Standard Specifications.

D. Spread and compact asphalt concrete pavement to the thickness as shown on the approved project plans.

11-5.04 MEASUREMENT AND PAYMENT

The Trail Pavement shall be measured and payment made at the contract lump sum or unit price and shall include full compensation for furnishing all labor, materials, tools, equipment,

incidentals and for doing all work including base, edges, and stabilizer as shown on the approved project plans, in accordance with these specifications and as directed by the City Engineer.

CHAPTER - 12

MISCELLANEOUS

MOBILIZATION

12-1.01 GENERAL

Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of all offices, buildings and other facilities necessary for work on the project; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site.

12-1.02 (BLANK)

12-1.03 (BLANK)

12-1.04 MEASUREMENT AND PAYMENT

Attention is directed to Sections 9-1.16, Progress Payments, and 9-1.17, Payment After Contract Acceptance, of the State Standard Specifications. Payment for mobilization will be made as follows:

A. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 5 percent or more of the original contract amount, 50 percent of the contract item price for mobilization or 5 percent of the original contract amount, whichever is the lesser, will be included in the estimate for payment.

B. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 10 percent or more of the original contract amount, the total amount earned for mobilization shall be 75 percent of the contract item price for mobilization or 7.5 percent of the original contract amount, whichever is the lesser, and that amount will be included in the estimate for payment.

C. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 20 percent or more of the original contract amount, the total amount earned for mobilization shall be 95 percent of the contract item price for mobilization or 9.5 percent of the original contract amount,

whichever is the lesser, and that amount will be included in the estimate for payment.

D. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 50 percent or more of the original contract amount, the total amount earned for mobilization shall be 100 percent of the contract item price for mobilization or 10 percent of the original contract amount, whichever is the lesser, and that amount will be included in the estimate for payment.

E. After acceptance of the contract pursuant to Section 9-1.17, Acceptance of Contract of the State Standard Specifications. The amount, if any, of the contract item price for mobilization in excess of 10 percent of the original contract amount will be included for payment in the first estimate made in conformance with the provisions in Section 9-1.17 of the State Standard Specifications.

The contract lump sum price paid for mobilization shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in mobilization as specified herein.

The adjustment provisions in Section 4-1.03, Changes of the State Standard Specifications and the retention of funds provisions in Section 9-1.16, Progress Payments of the State Standard Specifications, shall not apply to the contract lump sum item of mobilization.

When other contract items are adjusted as provided in Section 4-1.03, Changes of the State Standard Specifications, if the costs applicable to an item of work include mobilization costs, those mobilization costs will be deemed to have been recovered by the Contractor by the payments made for mobilization, and will be excluded from consideration in determining compensation under Section 4-1.03 of the State Standard Specifications.

When the contract does not include a contract pay item for mobilization as above specified, full compensation for any necessary mobilization required shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed.

FENCING

12-2.01 GENERAL

This work includes the furnishing of all labor, materials, equipment, facilities, transportation and services to complete all structural and miscellaneous steel work and related work for fencing as shown on the approved project plans and as specified herein.

12-2.02 MATERIALS

A . Fabric

Chain link fabrics to be "Galvanized-after" as manufactured by Anchor Fence Co. or approved equal and to be No.9 gauge with uniform square mesh measuring approximately 2 inches between its parallel sides. The fabric shall be woven and of the best quality open hearth steel, heavily zinc coated, after waving, by the hot dip spelter process.

The fabric shall be fastened to the line posts and rails by metal ties spaced approximately 14 inches (maximum) apart. Fabric shall be attached to the terminal post by means of a tension strip held by specially designed clips.

Vinyl Fabric

Chain link fabrics to be fused vinyl and to be No.9 gauge with uniform square mesh measuring approximately 2 inches between its parallel side. Fabric shall be 9 finished gauge woven Permafused wire with a uniform mesh 2 inches between the parallel sides. Fabric to be by Anchor Fence Co. or approved an equal.

The core wires shall be uniformly galvanized with zinc metal. The galvanized wire shall then be coated with a 7 mil. Coating of PVC applied by true fusion method over a thermoset plastic bonding agent.

The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory during the waving process. The color of the PVC coating shall be as specified by the City.

The fabric shall be fastened to the line posts and rails by metal ties spaced approximately 14 inches (maximum) apart. Fabric shall be attached to the terminal post by means of a tension strip held by specially designed clips.

B. Line Posts

Line posts shall be Schedule 40 (or an approved equal) hot dipped galvanized round column. Line posts shall be spaced no further than 10 feet on center.

Line Posts (with Vinyl Fabric)

Line posts shall be Schedule 40 hot dipped galvanized round column as specified in the approved project plans. Line posts shall be spaced no further than 10 feet on center. Etch galvanized surface, prime with rust inhibiting primer, and apply 2 coats of rust inhibiting paint to match fabric color. Powder coat line posts to match fabric.

C. Terminal Post

End, corner and pull posts shall be Schedule 40 (or approved equal) hot dipped galvanized pipe (round). Caps of terminal posts shall be flat and without decorative finial.

Terminal Post (with Vinyl Fabric)

End, corner and pull posts shall be hot dipped galvanized pipe (round) as specified in the approved project plans. Caps of terminal posts shall be flat and without decorative final. Etch galvanized surface, prime with rust inhibiting primer, and apply 2 coats of rust inhibiting paint to match fabric color. Powder coat line posts to match fabric.

D. Horizontal Rail

Rail to be hot dipped galvanized Schedule 40 pipe, or as otherwise specified, and shall be furnished in 20 feet lengths. Top and bottom rail to be joined using a press steel or malleable sleeve, not only allowing for expansion and contraction, but also providing a continuous brace from end to end of each stretch of fence. Fence, where shown on drawings, or over 12 feet high to have a center horizontal rail. Fence shall have continuous top and bottom rails. Fence shall have a continuous mid-rail where indicated on plan.

Horizontal Rail (with Vinyl Fabric)

Rail to be hot dipped galvanized Schedule 40 pipe and to be furnished in random lengths of approximately 20 feet. Top and bottom rail to be joined using a press steel or malleable sleeve, not only allowing for expansion and contraction, but also providing a continuous brace from end to end of each stretch of fence. Fence, where shown on drawings, or over 12 feet high to have a center horizontal rail. Fence shall have continuous top and bottom rails. Fence shall have a continuous mid-rail where indicated on plan. Prime and apply 2 coats of rust inhibiting to match fabric color paint.

E. Braces

All terminal posts on fence 6 feet and higher shall be braced with 1-5/8 inch outside diameter horizontal pipe bracing of the same material as the top rail, securely attached to the terminal and first line post with malleable iron fittings. They shall be truss braced from the first line post to the bottom of the terminal post, with a 3/8 inch galvanized truss rod assembly to provide the proper tension. Corner posts shall be braced in both directions.

Braces (with Vinyl Fabric)

All terminal posts on fence 6 feet and higher shall be braced with 1-5/8 inch outside diameter horizontal pipe bracing of the same material as the top rail, securely attached to the terminal and first line post with malleable iron fittings. They shall be truss braced from the first line post to the bottom of the terminal post, with a 3/8 inch galvanized truss rod assembly to provide the proper tension. Corner posts shall be braced in both directions. Braces shall be primed and painted to match fabric color.

F. Fittings

Hot dip galvanized. All fittings to be malleable cast iron or pressed steel.

Fittings (with Vinyl Fabric)

Hot dip galvanized. All fittings to be malleable cast iron or pressed steel. Prime and paint to match fence fabric.

G. Fabric Ties

11 gauge galvanized wire ties shall be used to tie the fabric to the hotline posts and top rail.

Fabric Ties (with Vinyl Fabric)

11 gauge galvanized, vinyl coated and color matching wire ties shall be used to tie the fabric to the line posts and top rail.

H. Frame Work Material

All posts, rails and braces to be heavy galvanized 2 ounce coating.

Frame Work Material (with Vinyl Fabric)

All posts, rails, and braes to be etch galvanized surface, prime with rust inhibiting primer and apply 2 coats of rust inhibiting primer and apply 2 coats of rust inhibiting paint to match fabric color.

I. Shape of Posts

Alternate shapes such as square pipe to be acceptable, only upon written approval.

Shape of Posts (with Vinyl Fabric)

Alternate shapes such as square pipe to be acceptable, only upon written approval.

J. Gates

1. Gates shall be of the widths designated in the drawings.

2. Gates greater than 8 feet in length shall have interior vertical members installed so that no panel exceeds 8 feet in length. Gate frames shall be constructed of not less than one inch pipe. Pipe shall conform to the requirements for posts and braces in Section 80-3.02B, Posts and Braces of the State Standard Specifications.

3. Gates frame panels shall be cross trussed with 3/8 inch adjustable truss rods. The corners of the gate frames shall be fastened together and reinforced with a malleable iron or a pressed steel fitting designed for the purpose, or by welding. Pressed steel fittings shall have a nominal thickness, before galvanizing, or not less than 0.135-inch and shall be fastened suitably to develop the strength of the connected members.

Gates (with Vinyl Fabric)

1. Gates shall be of the widths designated in the drawings.

2. Gates greater than 8 feet in length shall have interior vertical members installed so that no panel exceeds 8 feet in length. Gate frames shall be constructed of not less than one inch pipe. Pipe shall conform to the requirements for posts and braces in Section 80-3.02B. Posts and Braces of the State Standard Specifications. Powder coat gate frame to match fabric.

3. Gates frame panels shall be cross trussed with 3/8 inch adjustable truss rods. The corners of the gate frames shall be fastened together and reinforced with a malleable iron or a pressed steel fitting designed for the purpose, or by welding. Pressed steel fittings shall have a nominal thickness, before galvanizing, or not less than 0.135-inch and shall be fastened suitably to develop the strength of the connected members. Powder coat to match fabric.

K. Miscellaneous

1. Between posts, chain link fabric shall be fastened to a top and bottom tension wire where required. The tension wire shall be at least 7 gauge (0.177 dia.) coil spring steel of good commercial quality and shall be galvanized in accordance with the provisions of ASTM Destination: A, 116, Coating Class 3.

2. Hog rings shall be at least 9 gauge (0.148 inch diameter) steel and post clips shall be at least 6 gauge (0.192 inch diameter) steel; all these shall be galvanized in accordance with the provisions of ASTM Destination: A1 116, Coating Class.

3. Turnbuckles and truss tighteners shall be fabricated of commercial quality steel, malleable iron, or wrought iron and shall be galvanized as provided in Section 75-1.05, Galvanizing of the State Standard Specifications. The truss tighteners shall have a sharp thickness of not less than ¼ inch.

4. Portland cement concrete for metal post footings and for deadmen shall be produced from commercial quality aggregates and cement and shall contain not less than 470 pounds of cement per cubic yard Class 2 Concrete.

L. Miscellaneous (with Vinyl Fabric)

1. Between posts, chain link fabric shall be fastened to a top and bottom tension wire where required. The tension wire shall be at least 7 gauge (0.177 inch diameter) coil spring steel of good commercial quality and shall be galvanized in accordance with the provisions of ASTM Destination: A, 116, Coating Class 3. Paint to match fabric.

2. Hog rings shall be at least 9 gauge (0.148 inch diameter) steel and post clips shall be at least 6 gauge (0.192 inch diameter) steel; all these shall be galvanized in accordance with the provisions of ASTM Destination: A1 116, Coating Class. Paint to match fabric.

3. Turnbuckles and truss tighteners shall be fabricated of commercial quality steel, malleable iron, or wrought iron and shall be galvanized as provided in Section 75-1.02B, Galvanizing of the State Standard Specifications. The truss tighteners shall have a sharp thickness of not less than ¼ inch. Paint to match fabric.

4. Portland cement concrete for metal post footings and for deadmen shall be produced from commercial quality aggregates and cement and shall contain not less than 470 pounds of cement per cubic yard Class 2 Concrete.

12-2.03 EXECUTION

A. Posts

1. Line posts shall be spaced at not more than 10 feet on center. In general, in determining the post space measurement will be made parallel to the slope of the natural ground, and all posts shall be placed in a vertical position. In unusual locations, and where directed by the City Engineer, the posts shall be set perpendicular to the ground surface.

2. All posts shall be set in concrete footing conforming to the details shown on the plans and crowned at the top to shed water.

3. End, latch and corner posts shall be braced to the nearest line post. At the City Engineer's option, bracing shall be accomplished either with diagonal braces used as compression members or with horizontal braces used as compression members and 3/8 inch steel truss rods used as tension members. Gate posts shall be braced to the nearest line post with a horizontal braced used as a compression member and a 3/8 inch steel truss rods as tension members. Each 3/8 inch truss

shall be equipped with a turnbuckle or truss tightener with tensile strength equal to the truss rod. Line posts shall be braced horizontally and trussed in both directions at intervals not to exceed 1,000 feet, except that this bracing and trussing may be omitted when the fabric is installed by stretching with equipment.

B. Fabric

1. The fabric shall be stretched and securely fastened to the posts, and between posts the top and bottom edges of the fabric shall be fastened to the rails or tension wires. Tension wires shall be stretched tight. The bottom tension wire shall be installed on a straight grade between posts by excavating the high points of ground and in no case will filling of depressions by permitted.

2. The fabric shall be fastened to end, latch, corner, and gate posts with ¼ inch by ¾ inch stretcher bars and not less than ⅛ inch by ¾ inch stretcher bar band spaced at one foot intervals. The fabric shall be fastened to line posts with tie wires or post clips and to tension wires with tie wires or hog rings. The fasteners shall be spaced at approximately 14 inches on line posts and at approximately 18 inches on rails or tension wires. Wire ties shall be given at least one complete turn. Hog rings shall be closed with ends overlapping. The tension wire shall be wrapped around terminal posts. The distance from the top of the fabric to the top tension wire shall be 2 inches maximum

3. Chain link fence fabric specified for the fence shall be attached to the gate frame by the use of stretcher bars and tie wires as specified for fence construction, and suitable tension connectors shall be spaced at approximately one foot intervals.

C. Gates

1. The gates shall be hung by at least 2 steel or malleable iron hinges not less than 3 inches in width, so designed as to securely clamp to the gate post and permit the gate to be swung back against the fence. The bottom hinge shall have a socket to take the ball end of the gate frame.

2. Gates shall be provided with a combination steel or malleable iron catch and locking attachment of approved design which will not rotate around the latch post. Stops to hold gates open and a center rest with catch shall be provided whererequired.

CONCRETE STRUCTURES

12-3.01 GENERAL

This work shall consist of Constructing Concrete Structures Including Concrete Pavements, and drainage Inlets.

12-3.02 MATERIALS

Materials for Concrete Structures shall conform with Section 40, PCC Pavement, Section 51, Concrete Structures, Section 52, Reinforcement and Section 90, Portland Cement Concrete of the State Standard Specifications unless otherwise noted on the approved project plans.

12-3.03 EXECUTION

Execution of Concrete Structures shall conform with Sections 40, 51, 52, and 90 of the State Standard Specifications, unless otherwise noted on the approved project plans.

12-3.04 MEASUREMENT AND PAYMENT

Measurement and Payment of Concrete Structures shall conform with Sections 40, 51, 52, and 90 of the State Standard Specifications, unless otherwise noted on the approved project plans.

PAINTING

12-4.01 GENERAL

This work shall consist of painting new installations and repainting existing installations in conformance with the provisions of these specifications.

12-4.02 MATERIALS

Materials for painting shall conform with Section 59, Painting and Section 91, Paint of the State Standard Specifications, unless otherwise noted on the approved project plans.

12-4.03 EXECUTION

Execution of painting shall conform with Sections 59 and 91 of the State Standard Specifications, unless otherwise noted on the approved project plans.

12-4.04 MEASUREMENT AND PAYMENT

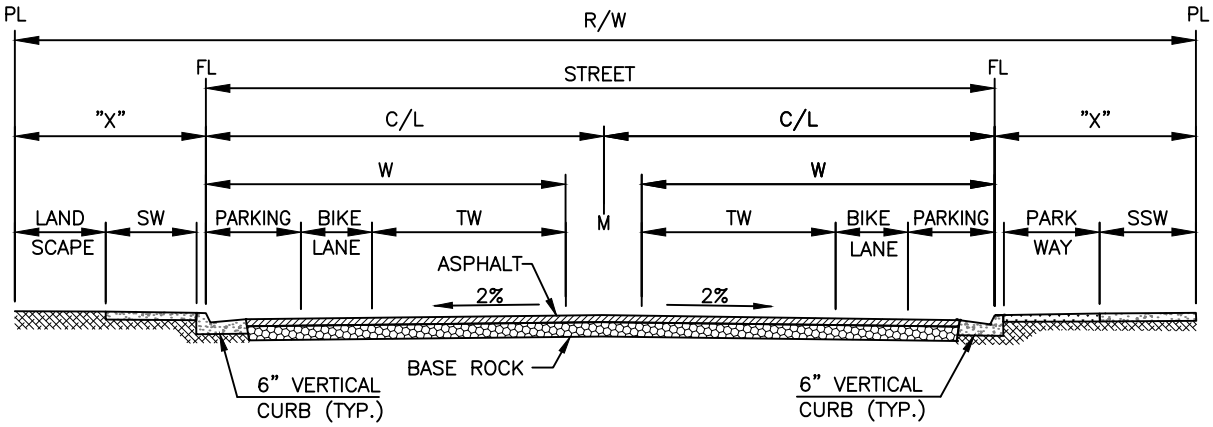
Measurement and Payment of painting shall conform with Sections 59 and 91 of the State Standard Specifications, unless otherwise noted on the approved project plans.

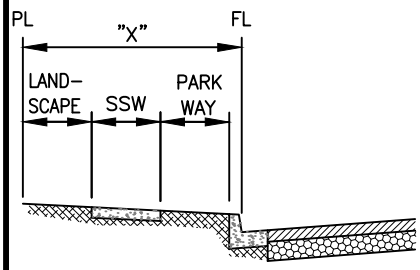
CITY OF CERES
STANDARD DESIGNS

STREETS

CITY OF CERES STREET SECTIONS

DESIGNATION	R/W	STREET	C/L	"X"	W	M	TW	PARKING	BIKE LANE	PARK WAY	SSW	SW	LAND SCAPE
MINOR, CUL-DE-SAC, SERVICE ROADS	50'	36'	18'	7'	18'	N/A	10'	8'	N/A	N/A	N/A	5'	2'
MINOR ROAD WITH BIKE LANES	60'	46'	23'	7'	23'	N/A	10'	8'	5'	N/A	N/A	5'	2'
2 LANE COLLECTOR	60'	40'	20'	10'	20'	N/A	12'	8'	N/A	5'	5'	5'	5'
2 LANE COLLECTOR WITH BIKE LANES	70'	50'	25'	10'	25'	N/A	12'	8'	5'	5'	5'	5'	5'
2 LANE COLLECTOR (INDUSTRIAL)	70'	50'	25'	10'	25'	N/A	15'	10'	N/A	5'	5'	10'	N/A
4 LANE COLLECTOR (INDUSTRIAL)	110'	90'	45'	10'	45'	N/A	30'	15'	N/A	5'	5'	10'	N/A
4 LANE COLLECTOR	80'	64'	32'	8'	32'	N/A	24'	8'	N/A	3'	5'	8'	N/A
4 LANE COLLECTOR WITH BIKE LANES	90'	74'	37'	8'	37'	N/A	24'	8'	5'	3'	5'	8'	N/A
4 LANE MAJOR	100'	80'	40'	10'	32'	16'	24'	8'	N/A	5'	5'	10'	N/A
4 LANE COLLECTOR (DIVIDED)	90'	70'	35'	10'	32'	6'	24'	8'	N/A	5'	5'	10'	N/A
4 LANE MAJOR WITH BIKE LANES	100'	72'	36'	14'	30'	12'	24'	N/A	6'	6'	8'	N/A	N/A
4 LANE EXPRESSWAY	110'	86'	43'	12'	32'	22'	24'	8'	N/A	6'	6'	12'	N/A
6 LANE EXPRESSWAY	110'	86'	43'	12'	36'	14'	36'	N/A	N/A	6'	6'	12'	N/A



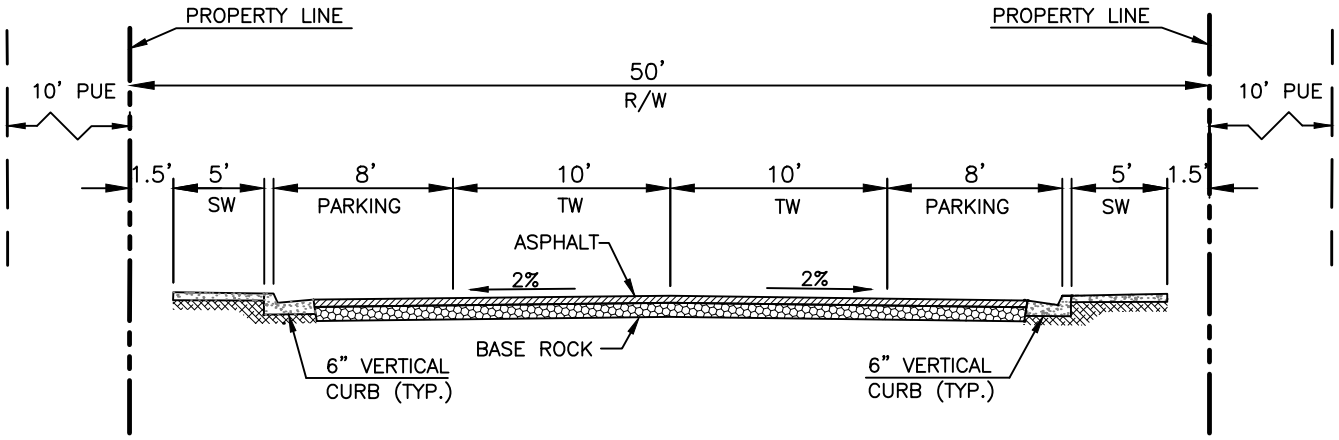


IN INFILL AREAS, WHERE EXISTING RIGHTS-OF-WAY MAY NOT CONFORM TO THE ROADWAY STANDARDS SET FORTH IN THE GENERAL PLAN, BUT WHERE IMPROVEMENTS ARE NECESSARY, REASONABLE DEVIATIONS FROM ROADWAY STANDARDS MAY BE ALLOWED BY THE CITY ENGINEER.

APPROPRIATE PAVEMENT SECTION TO BE DESIGNED BASED ON THE R-VALUE AND T.I. STUDIES, OR AS REQUIRED BY THE CITY ENGINEER.

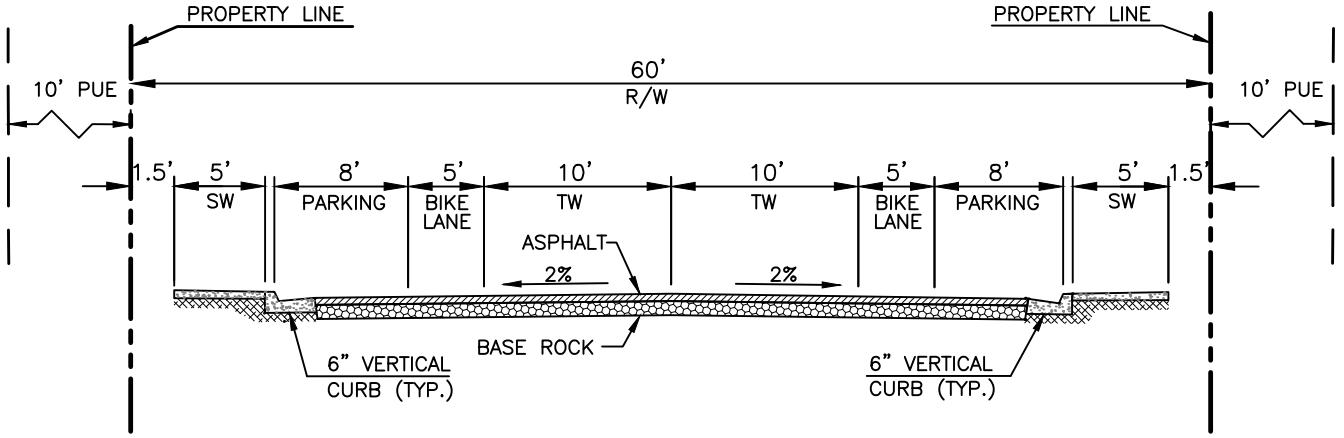
TYPICAL STREET SECTIONS

	PREPARED BY: SER	CITY OF CERES **ENGINEERING DEPARTMENT**	**PLATE NO:** ST-1
	CHECKED BY: DRJ	**APPROVED BY**	**COUNCIL APPROVAL DATE** DATE 03/26/2018
	SCALE: NONE	**CITY ENGINEER – DARYL JORDAN – RCE** 58036	



50 FT MINOR, CUL-DE-SAC, SERVICE ROADS

NOT TO SCALE



60 FT MINOR ROAD WITH BIKE LANES

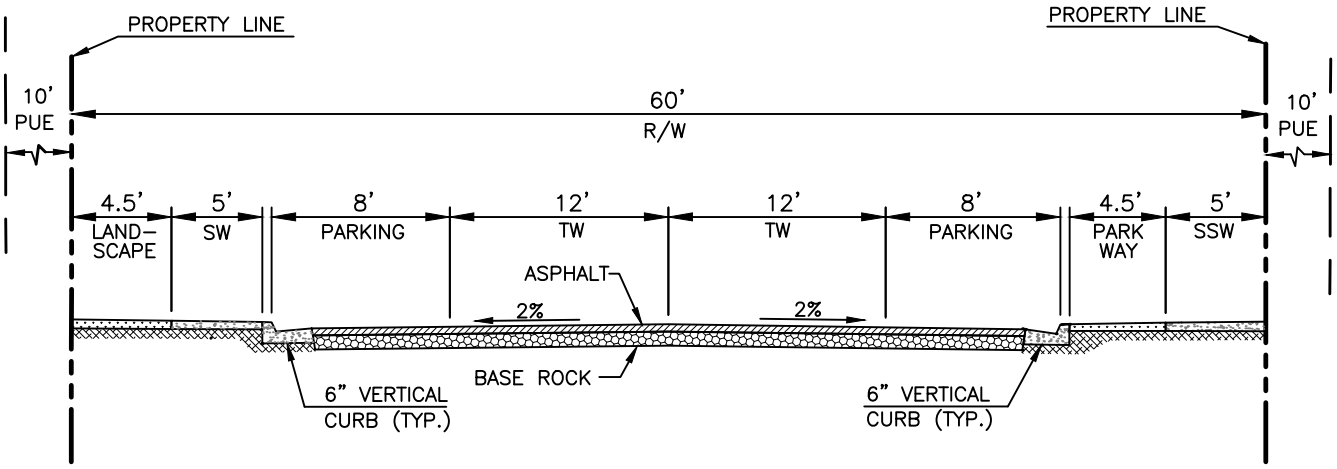
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

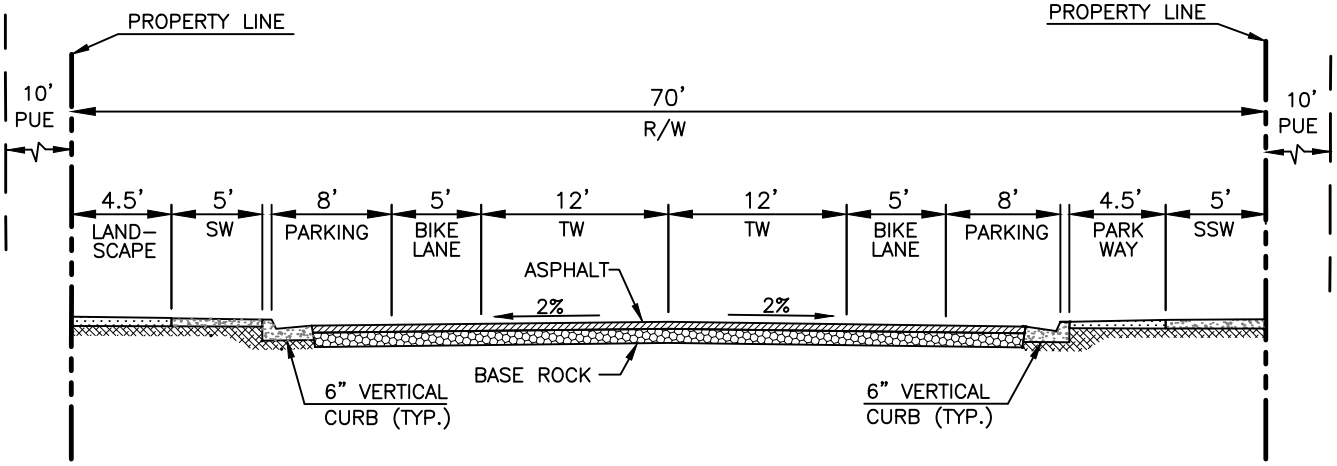
CUL-DE-SAC & MINOR STREET WITH BIKE LANES

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-2
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



60 FT 2 LANE COLLECTOR

NOT TO SCALE



70 FT 2 LANE COLLECTOR WITH BIKE LANES

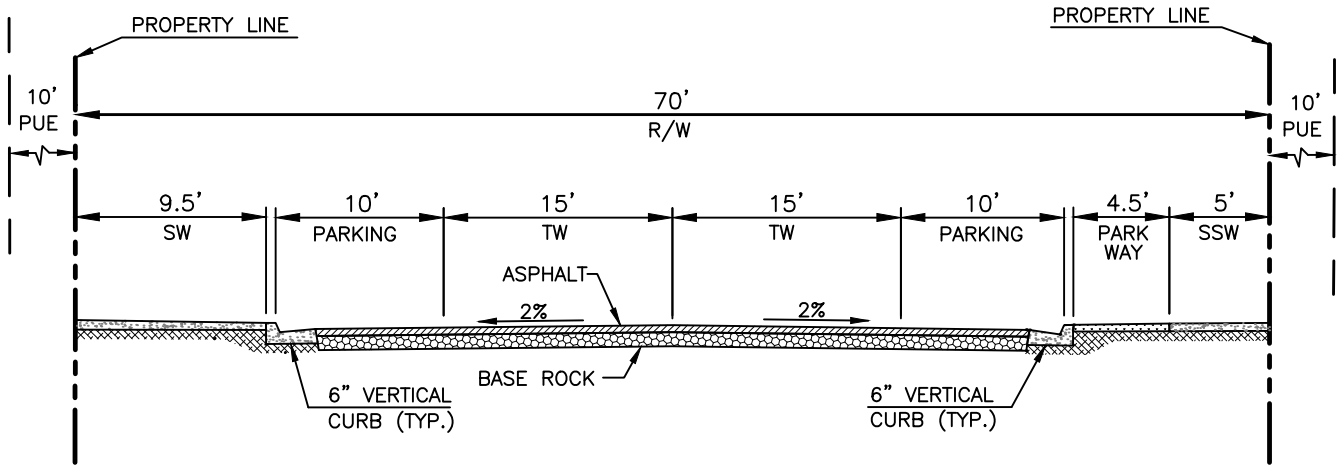
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

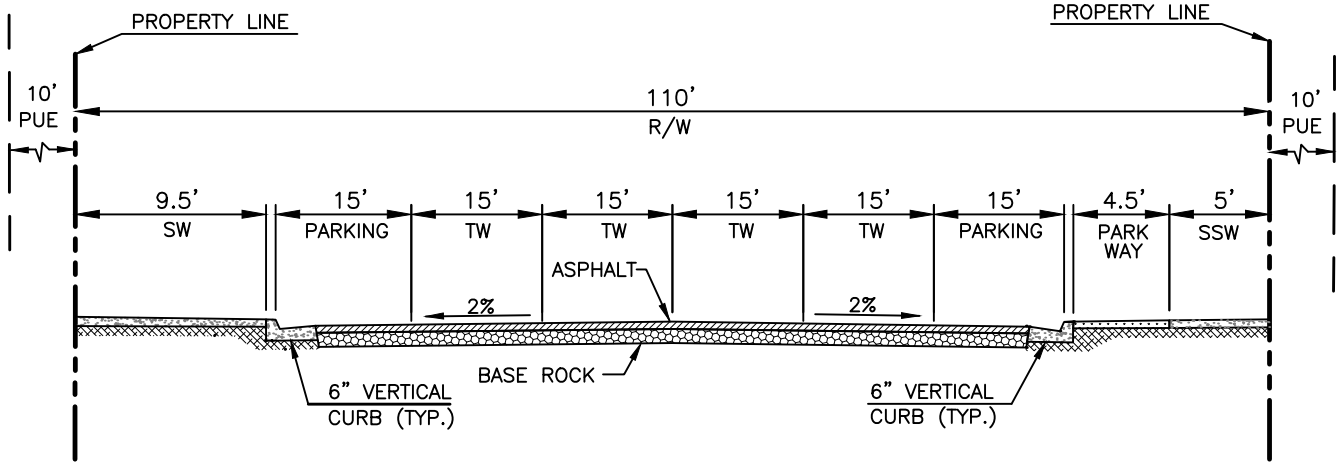
2 LANE COLLECTOR STREET WITH BIKE LANES

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-3
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



70 FT 2 LANE COLLECTOR INDUSTRIAL

NOT TO SCALE



110 FT 4 LANE COLLECTOR INDUSTRIAL

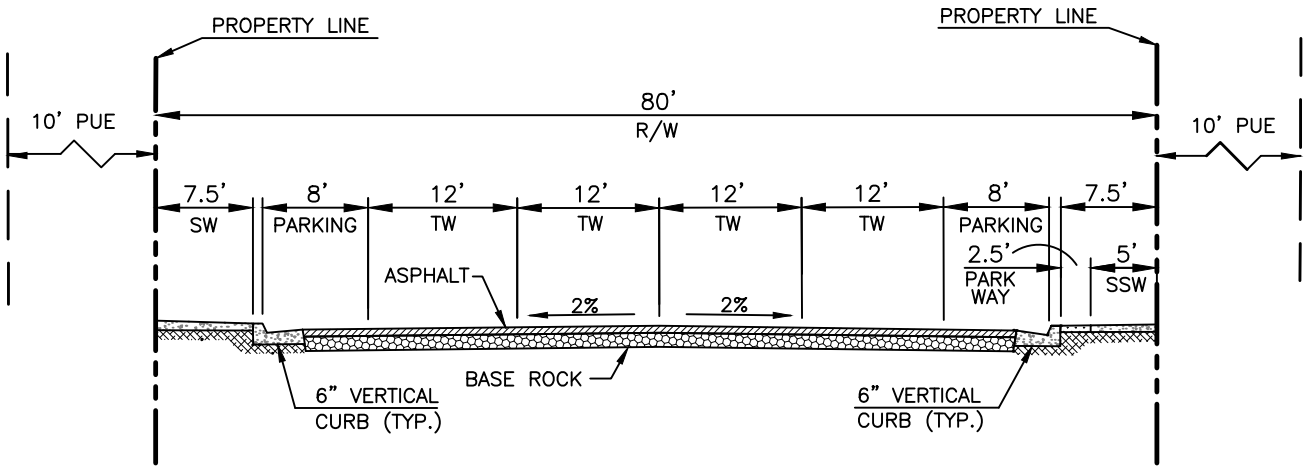
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

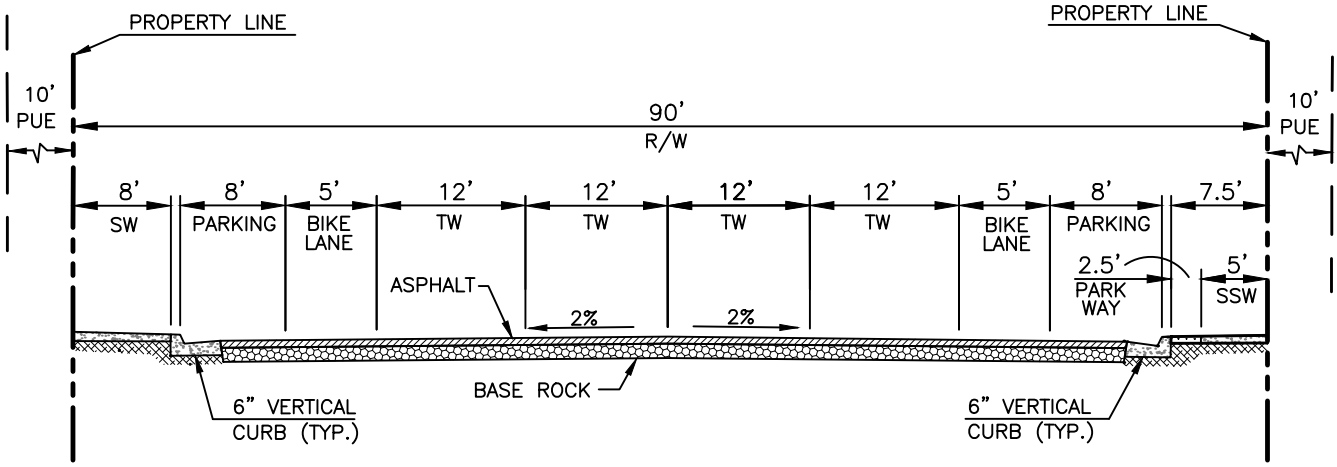
2 LANE/4 LANE COLLECTOR (INDUSTRIAL) STREET

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-4
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



80 FT 4 LANE COLLECTOR

NOT TO SCALE



90 FT 4 LANE COLLECTOR WITH BIKE LANE

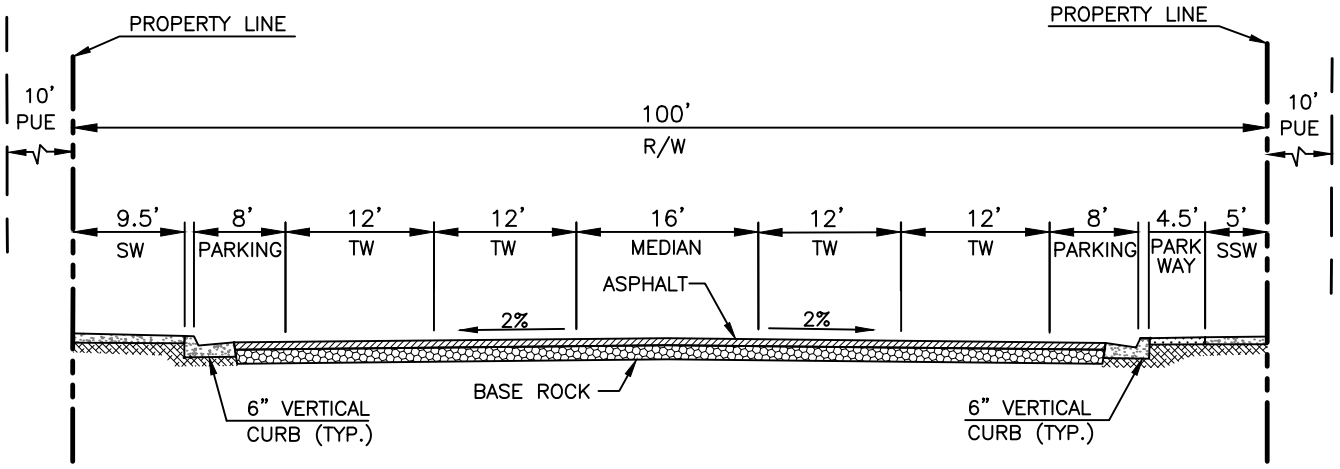
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

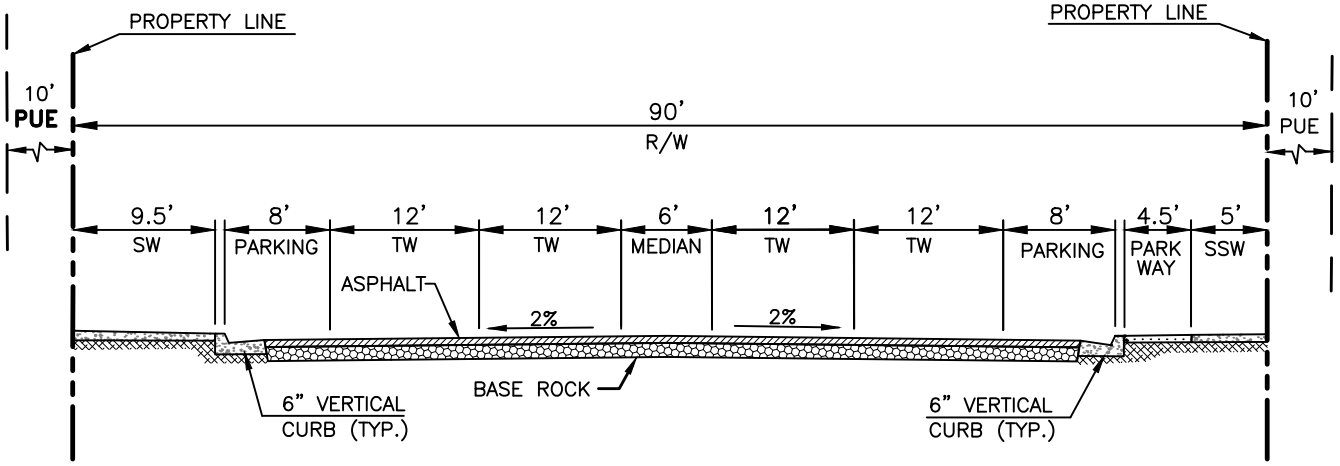
4 LANE COLLECTOR STREET WITH BIKE LANES

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-5
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



100 FT 4 LANE MAJOR

NOT TO SCALE



90 FT 4 LANE COLLECTOR DIVIDED

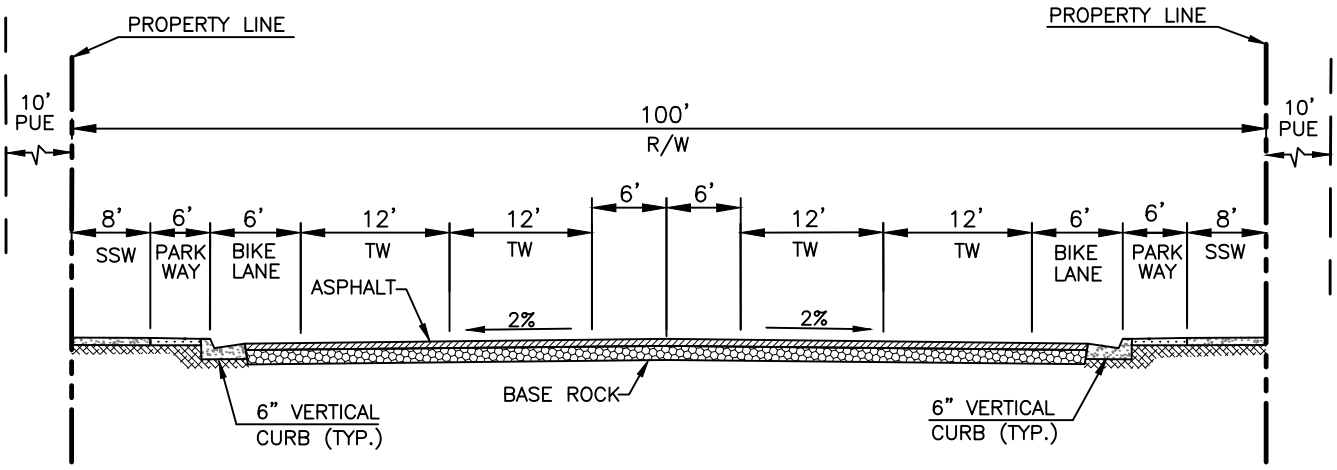
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

4 LANE MAJOR & 4 LANE COLLECTOR (DIVIDED) STREET

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-6
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



100 FT 4 LANE MAJOR WITH BIKE LANES

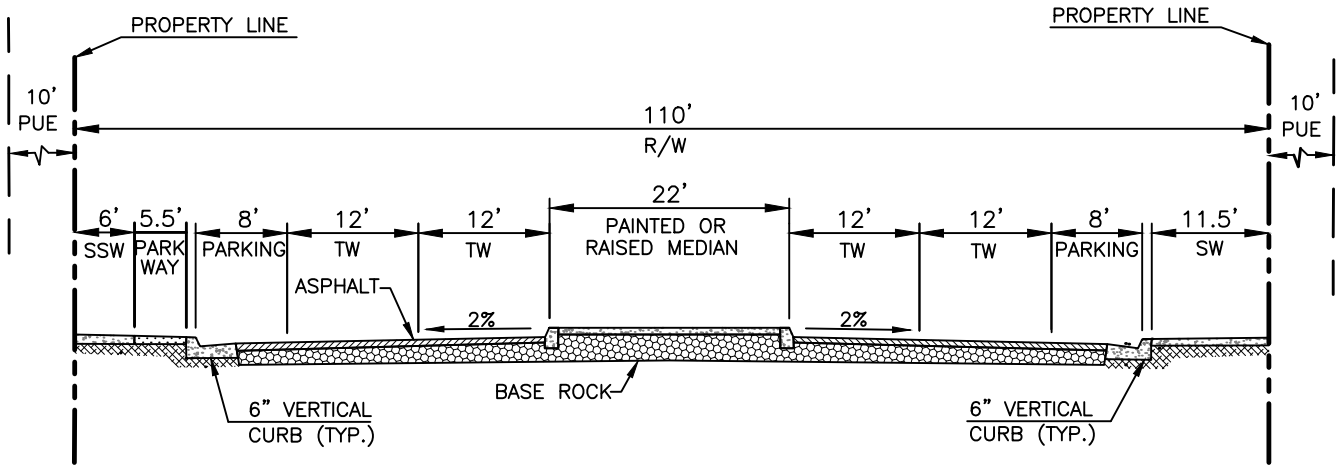
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

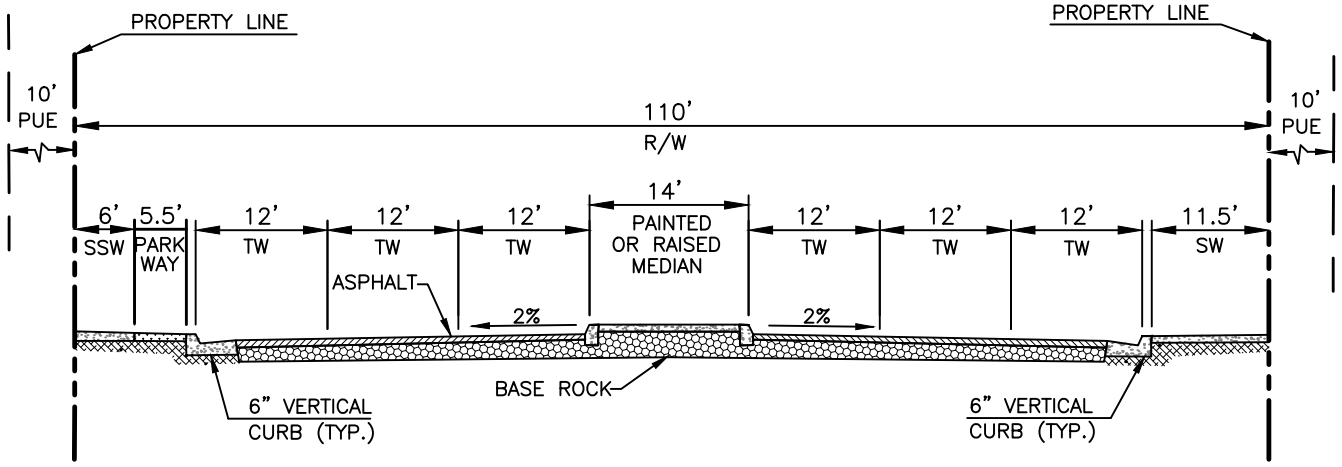
4 LANE MAJOR STREET WITH BIKE LANES

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-7
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE DATE 03/26/2018
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	



110 FT 4 LANE EXPRESSWAY

NOT TO SCALE



110 FT 6 LANE EXPRESSWAY

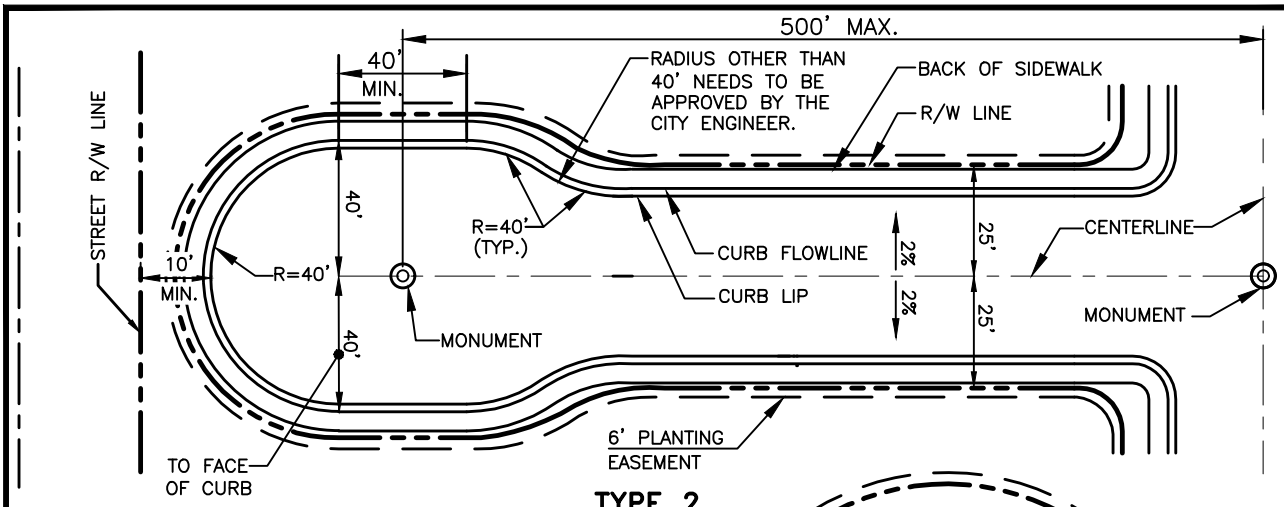
NOT TO SCALE

NOTE:

1. SIDEWALK SLOPE 1.5 % MAX BETWEEN BACK OF CURB AND RIGHT-OF-WAY.
2. PAVEMENT CROSS SLOPE SHALL BE 2.0% MINIMUM ON NEW ROAD CONSTRUCTION.
3. INSTALL CONCRETE CURB PER STANDARD DETAIL C-1.
4. INSTALL CONCRETE SIDEWALK PER STANDARD DETAIL C-2.
5. IN RESIDENTIAL AREAS, CURB PARKING IS ALLOWED. IN AREAS THAT PARKING IS NOT DESIRED, INSTALL "NO PARKING ANY TIME" SIGNS TWO FEET FROM FLOWLINE AND SPACE THE SIGNS 100 FT APART.

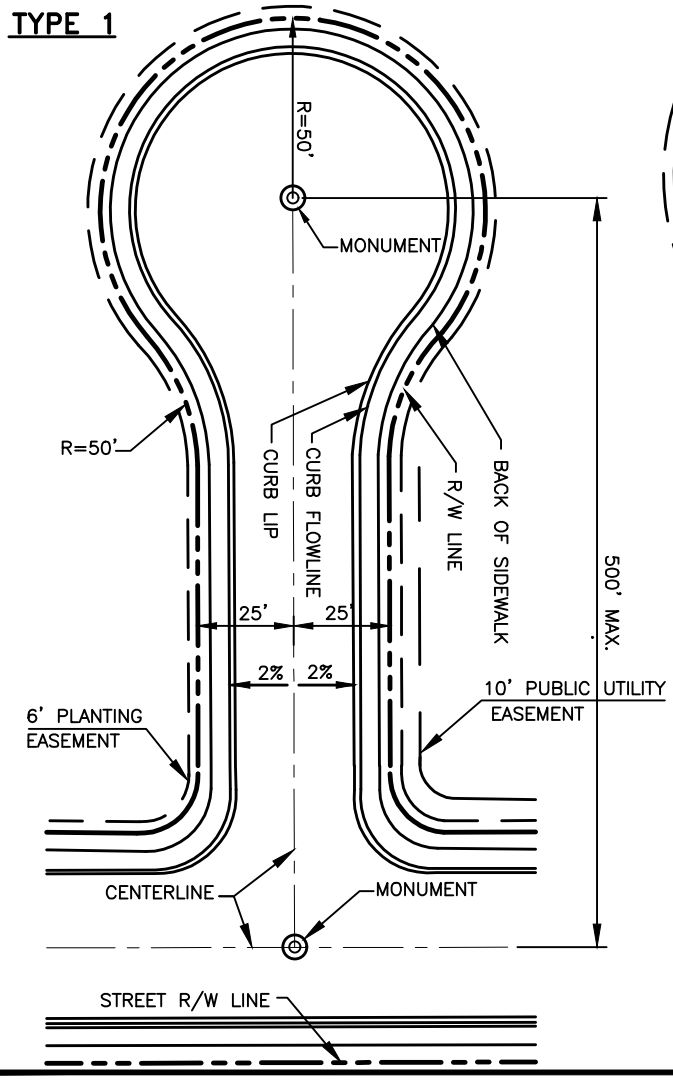
4 LANE /6 LANE EXPRESSWAY STREET

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: ST-8
	CHECKED BY: NAME	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

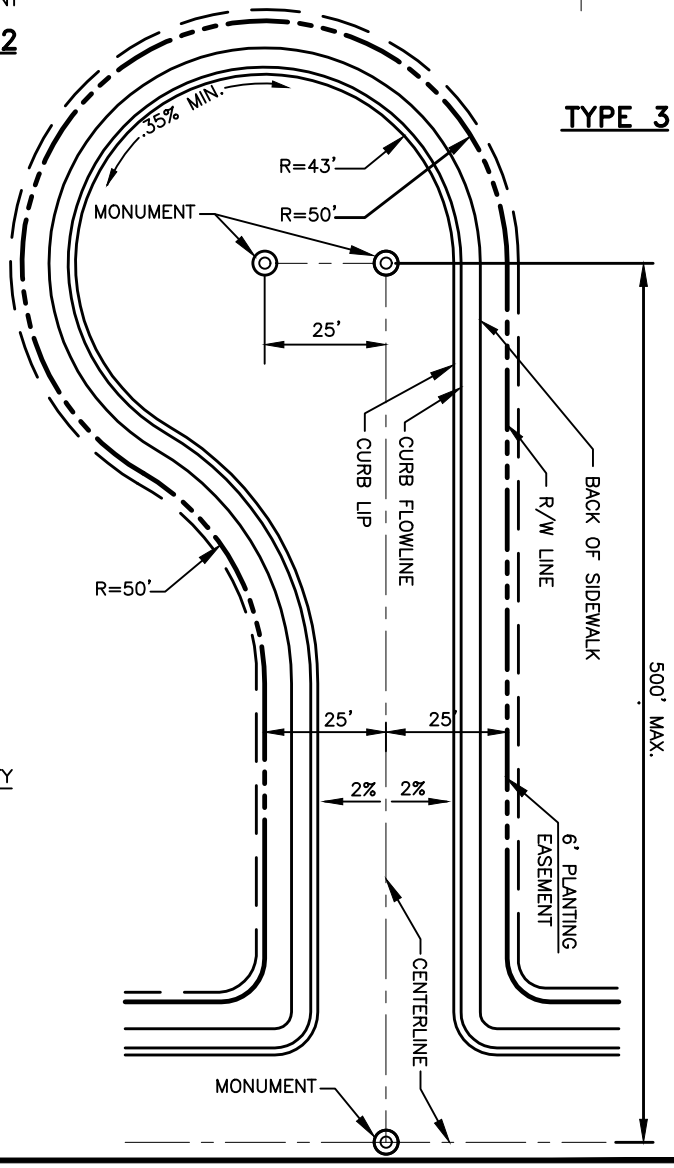


TYPE 2

TYPE 1

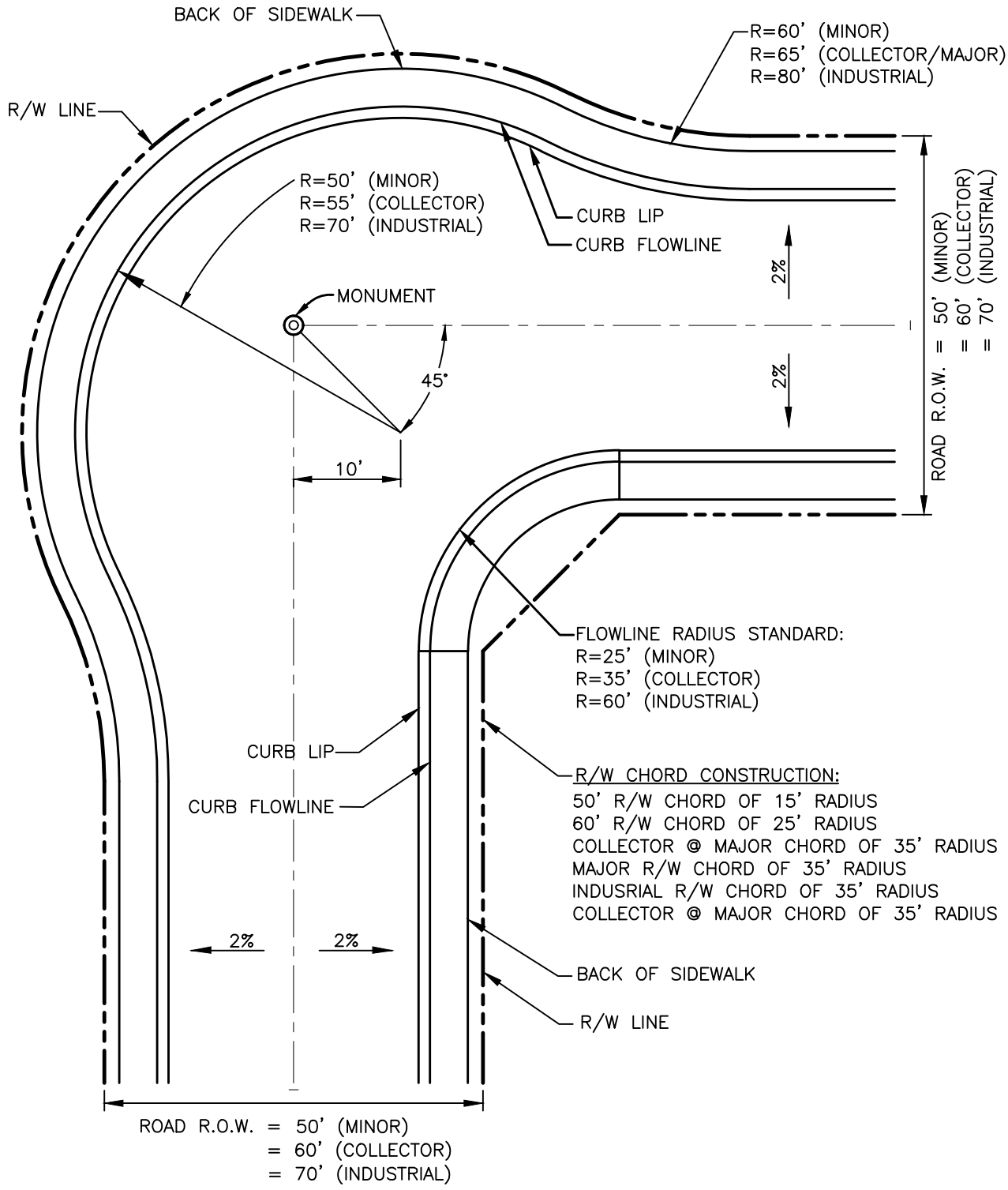


TYPE 3



STANDARD CUL-DE-SAC STREET

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: ST-9
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



STANDARD INTERSECTION KNUCKLE STREET

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: ST-10 COUNCIL APPROVAL DATE DATE 03/26/2018

STRUCTURAL SECTION REQUIREMENTS

TI	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0		4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	WITHOUT SAFETY FACTOR (5.0–8.0)				WITH SAFETY FACTOR (8.0–12.0)														
R-VALUE	REQUIRED AC (HMA) THICKNESS (FEET)										REQUIRED AB THICKNESS (FEET)								
5	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.60	0.95	1.25	1.45	1.50	1.70	1.95	2.20	2.40
10	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.55	0.85	1.15	1.35	1.35	1.60	1.80	2.00	2.20
15	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.50	0.80	1.05	1.25	1.25	1.45	1.65	1.85	2.05
20	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.40	0.70	1.00	1.15	1.15	1.30	1.50	1.70	1.85
25	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.65	0.90	1.05	1.00	1.20	1.35	1.55	1.70
30	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.55	0.80	0.95	0.90	1.05	1.20	1.40	1.50
35	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.50	0.70	0.85	0.80	0.95	1.10	1.20	1.35
40	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.40	0.65	0.75	0.65	0.80	0.95	1.05	1.15
45	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.35	0.55	0.65	0.55	0.65	0.80	0.90	1.00
50	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.35	0.45	0.55	0.45	0.55	0.65	0.75	0.80
55	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.35	0.35	0.45	0.35	0.40	0.50	0.60	0.65
60	0.20	0.20	0.20	0.25	0.40	0.45	0.50	0.55	0.60		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.40	0.45

NOTES

1. THE MINIMUM T.I. USED TO DETERMINE THE STRUCTURAL SECTION FOR A MAJOR INTERSECTION SHALL BE T.I. 11 AND AN INDUSTRIAL INTERSECTION SHALL BE T.I. 10.
2. THE FOLLOWING CONDITIONS APPLIED TO FORMULATING THE ABOVE STRUCTURAL DESIGNS:
   - A) THE CHART UTILITIZED THE R–VALUE DESIGN METHOD USED BY THE CALIFORNIA DEPARTMENT OF TRANSPORTATION AS DETAILED IN THE "HIGHWAY DESIGN MANUAL" AND THE "FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN AS DETAILED IN THE "HIGHWAY DESIGN MANUAL" AND THE "FLEXIBLE PAVEMENT STRUCTURAL SECTION DESIGN GUIDE FOR CALIFORNIA CITIES AND COUNTIES", 3RD EDITION (JANUARY,1979)
   - B) THE FOLLOWING CONDITIONS APPLIED TO THE DESIGN GUIDELINES:
     1) USED A SAFETY FACTOR FOR All TRAFFIC INDEX (T.I.) OF 8.0 OR GREATER.
     2) ADJUSTED RESULTING AB THICKNESSES TO CONFORM TO THE CITY'S ACCEPTABLE MINIMUM
     3) MAXIMUM ACCEPTABLE R–VALUE USED IN CALCULATING STREET PAVEMENT WAS R–VALUE 60. AB THICKNESS OF 0.35'.

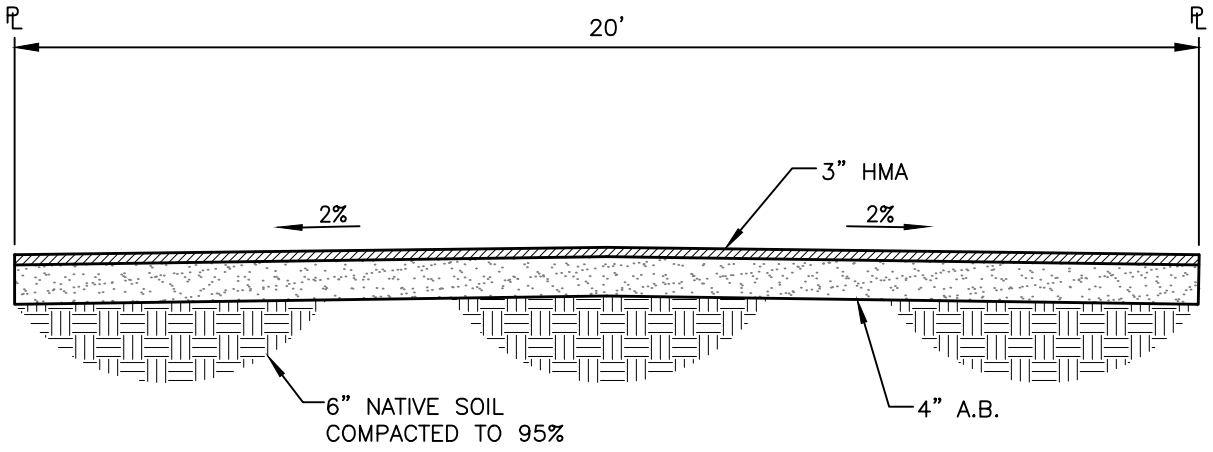
STRUCTURAL STREET SECTION REQUIREMENTS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: ST–11A COUNCIL APPROVAL DATE DATE 03/26/2018

FULL DEPTH HOT MIX ASPHALT (HMA) CONCRETE STRUCTURAL SECTION REQUIREMENTS															
TI	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
R-VALUE	REQUIRED HOT MIX ASPHALT (HMA) CONCRETE THICKNESS (FEET)														
5	0.60	0.70	0.75	0.85	0.90	0.95	1.00	1.10	1.15	1.25	1.30	1.40	1.45	1.55	1.60
10	0.60	0.65	0.70	0.80	0.80	0.95	1.00	1.05	1.10	1.20	1.25	1.35	1.40	1.50	1.55
15	0.55	0.65	0.70	0.75	0.80	0.90	0.95	1.05	1.05	1.15	1.20	1.30	1.35	1.40	1.45
20	0.55	0.60	0.65	0.75	0.80	0.85	0.90	1.00	1.00	1.10	1.15	1.25	1.30	1.35	1.40
25	0.50	0.60	0.65	0.70	0.75	0.80	0.85	0.95	1.00	1.05	1.10	1.20	1.20	1.30	1.35
30	0.45	0.55	0.60	0.65	0.70	0.80	0.80	0.90	0.95	1.00	1.05	1.10	1.15	1.25	1.25
35	0.40	0.55	0.55	0.65	0.65	0.75	0.75	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
40	0.40	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15
45	0.35	0.40	0.50	0.55	0.60	0.65	0.60	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.05
50	0.30	0.40	0.45	0.55	0.55	0.60	0.60	0.70	0.75	0.80	0.80	0.90	0.90	0.95	1.00
55	0.30	0.40	0.40	0.50	0.50	0.55	0.60	0.65	0.70	0.75	0.75	0.80	0.85	0.90	0.95
60	0.25	0.35	0.40	0.45	0.45	0.50	0.55	0.60	0.65	0.70	0.70	0.75	0.80	0.85	0.85
65	0.25	0.35	0.35	0.40	0.40	0.45	0.45	0.55	0.55	0.60	0.65	0.70	0.70	0.75	0.80
70	0.20	0.25	0.30	0.35	0.35	0.40	0.40	0.50	0.50	0.55	0.60	0.60	0.65	0.70	0.70
75	0.20	0.25	0.25	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.50	0.55	0.55	0.60	0.60
80	0.20	0.20	0.20	0.25	0.25	0.30	0.30	0.35	0.35	0.40	0.40	0.45	0.45	0.50	0.55

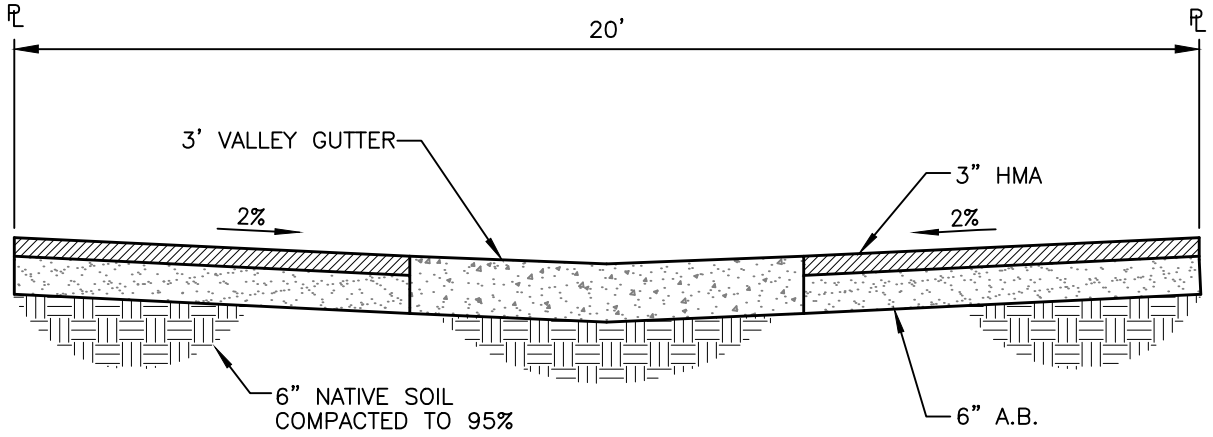
STRUCTURAL STREET SECTION REQUIREMENTS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: ST-11B
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



RESIDENTIAL SECTION

1. VALLEY GUTTER MAY BE REQUIRED BY CITY ENGINEER.



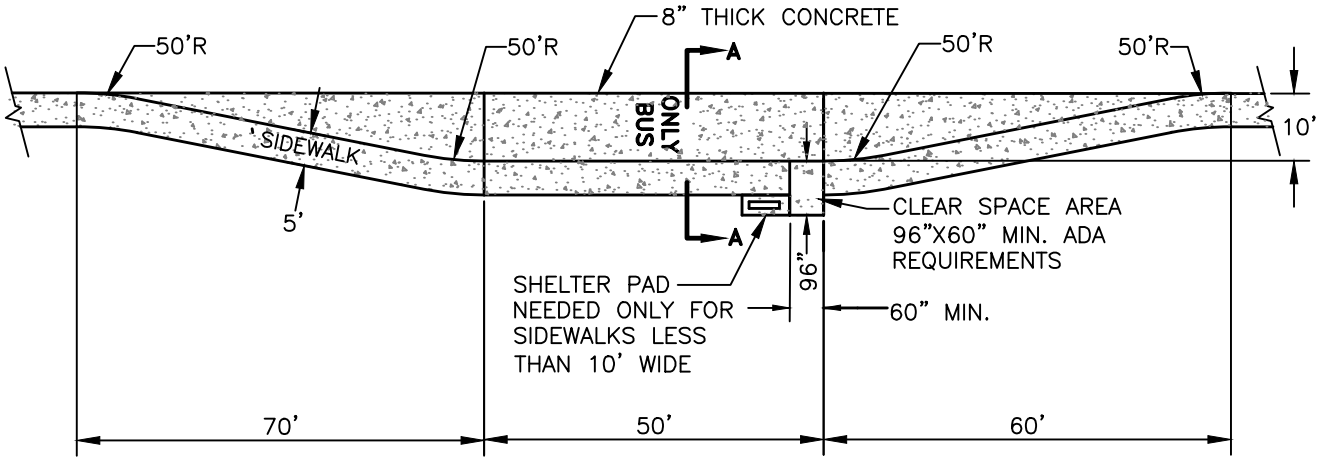
COMMERCIAL SECTION

NOTES:

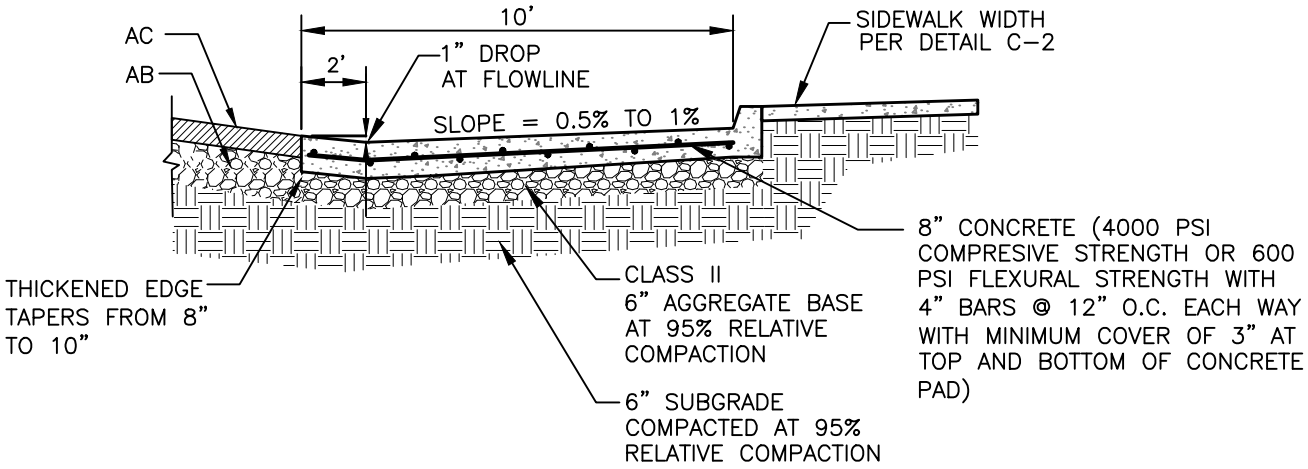
1. FOR VALLEY GUTTER DETAIL SEE STANDARD DETAIL C-1
2. GRADES AND DRAINAGE SHALL BE APPROVED BY THE CITY ENGINEER

CITY ALLEY SECTIONS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: ST-12
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



PLAN



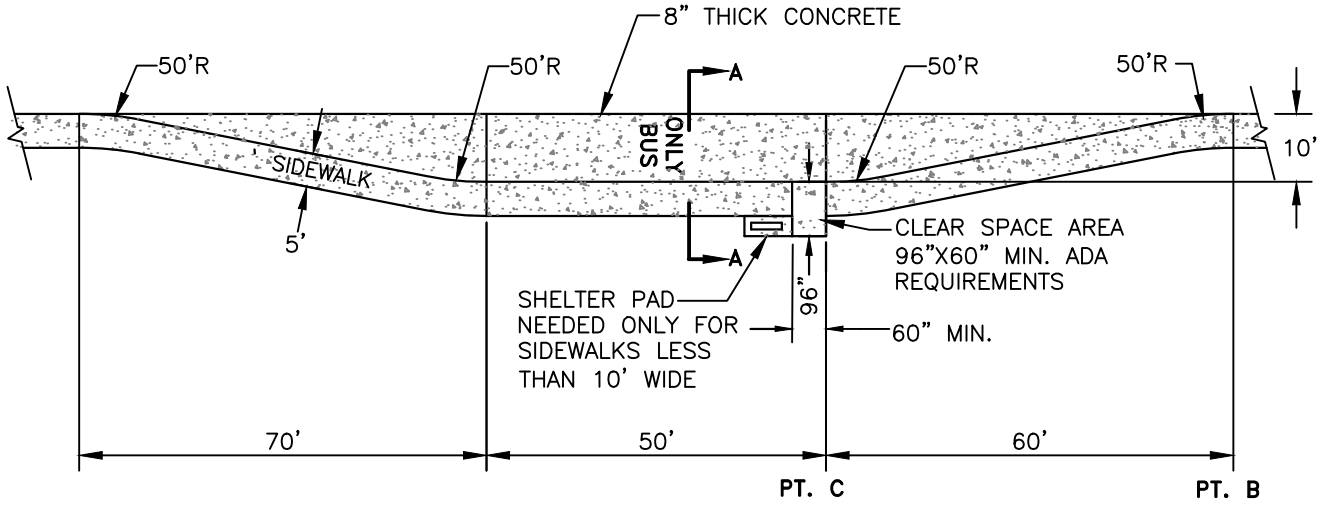
TYPICAL CROSS SECTION A - A

NOTES:

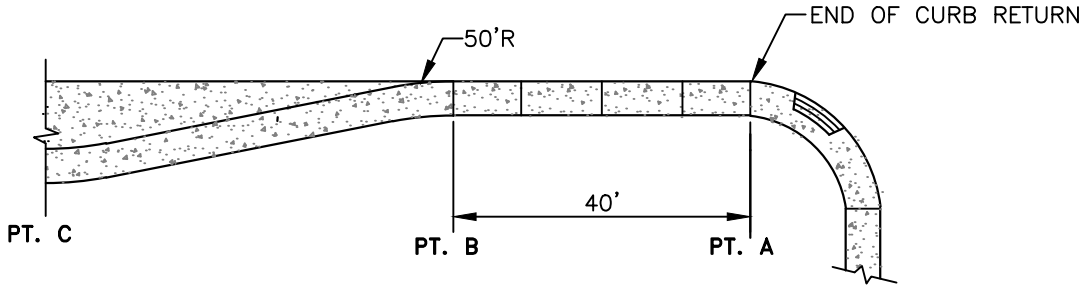
1. NO EXTRA SHELTER PAD NEEDED FOR SIDEWALKS WIDER THAN 10 FEET.
2. SHELTER PAD AND SHELTERS MUST BE WIDE ENOUGH TO MEET ADA REQUIREMENTS 4.0' X 3.0' CLEAR FLOOR AREA WITHIN SHELTER PERIMETER.
3. ADDITIONAL RIGHT OF WAY MAY BE REQUIRED AT TRANSIT LOCATIONS AND INTERSECTIONS.
4. SHELTER PAD AND SHELTERS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE LATEST EDITION OF ADA STANDARDS FOR TRANSPORTATION FACILITIES (SECTION 810.3). REFER TO SECTION 810 "TRANSPORTATION FACILITIES" AT WWW.ACCESS-BOARD.GOV
5. UNSUITABLE SOIL UNDER THE BUS TURN OUT SHALL BE REMOVED AND REPLACED WITH A BEDDING CONSISTING OF SAND OR PEA GRAVEL WITH A MINIMUM THICKNESS THAT CAN ACCOMMODATE BUS TRAFFIC AND BUS LOADING, REFER TO CROSS SECTION A-A.

MIDBLOCK BUS TURNOUT

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: ST-13
CHECKED BY: NAME	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



NOTE: REFER TO PLATE ST-13 FOR TYPICAL CROSS SECTION A-A DETAIL

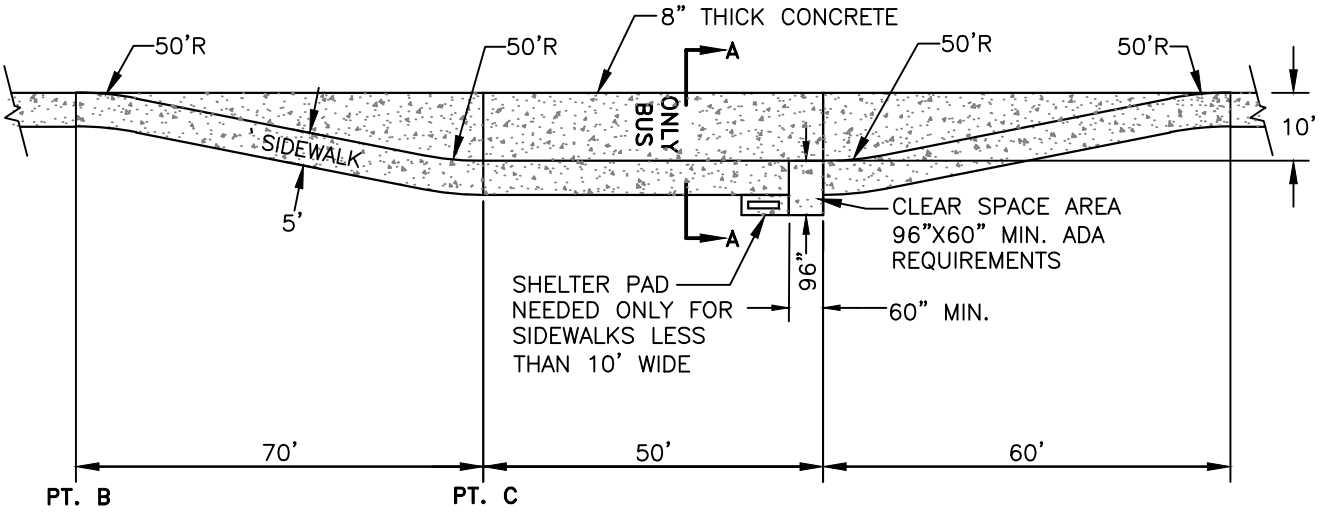


NOTES:

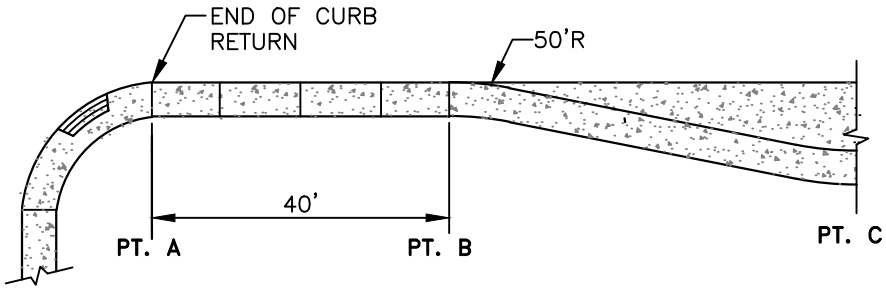
1. NO EXTRA SHELTER PAD NEEDED FOR SIDEWALKS WIDER THAN 10 FEET.
2. SHELTER PAD AND SHELTERS MUST BE WIDE ENOUGH TO MEET ADA REQUIREMENTS 4.0' X 3.0' CLEAR FLOOR AREA WITHIN SHELTER PERIMETER.
3. ADDITIONAL RIGHT OF WAY MAY BE REQUIRED AT TRANSIT LOCATIONS AND INTERSECTIONS.
4. SHELTER PAD AND SHELTERS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE LATEST EDITION OF ADA STANDARDS FOR TRANSPORTATION FACILITIES (SECTION 810.3). REFER TO SECTION 810 "TRANSPORTATION FACILITIES" AT WWW.ACCESS-BOARD.GOV
5. UNSUITABLE SOIL UNDER THE BUS TURN OUT SHALL BE REMOVED AND REPLACED WITH A BEDDING CONSISTING OF SAND OR PEA GRAVEL WITH A MINIMUM THICKNESS THAT CAN ACCOMMODATE BUS TRAFFIC AND BUS LOADING (PER SOIL REPORT'S RECOMMENDATION).

NEARSIDE BUS TURNOUT

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: ST-14
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



NOTE: REFER TO PLATE ST–13 FOR TYPICAL CROSS SECTION A–A DETAIL



NOTES:

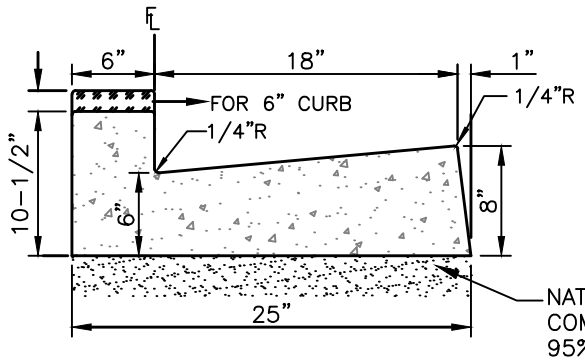
1. NO EXTRA SHELTER PAD NEEDED FOR SIDEWALKS WIDER THAN 10 FEET.
2. SHELTER PAD AND SHELTERS MUST BE WIDE ENOUGH TO MEET ADA REQUIREMENTS 4.0' X 3.0' CLEAR FLOOR AREA WITHIN SHELTER PERIMETER.
3. ADDITIONAL RIGHT OF WAY MAY BE REQUIRED AT TRANSIT LOCATIONS AND INTERSECTIONS.
4. SHELTER PAD AND SHELTERS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE LATEST EDITION OF ADA STANDARDS FOR TRANSPORTATION FACILITIES (SECTION 810.3). REFER TO SECTION 810 "TRANSPORTATION FACILITIES" AT WWW.ACCESS–BOARD.GOV
5. UNSUITABLE SOIL UNDER THE BUS TURN OUT SHALL BE REMOVED AND REPLACED WITH A BEDDING CONSISTING OF SAND OR PEA GRAVEL WITH A MINIMUM THICKNESS THAT CAN ACCOMMODATE BUS TRAFFIC AND BUS LOADING (PER SOIL REPORT'S RECOMMENDATION).

FARSIDE BUS TURNOUT

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: ST–15 COUNCIL APPROVAL DATE DATE 03/26/2018

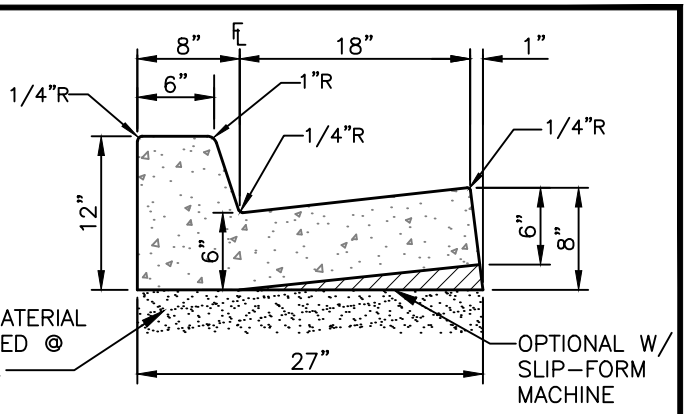
CITY OF CERES
STANDARD DESIGNS

CONCRETE CONSTRUCTION

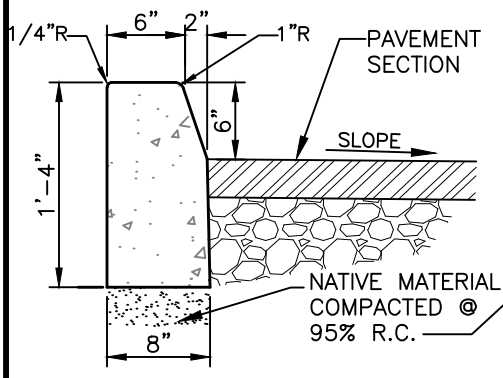


RETURN CURB

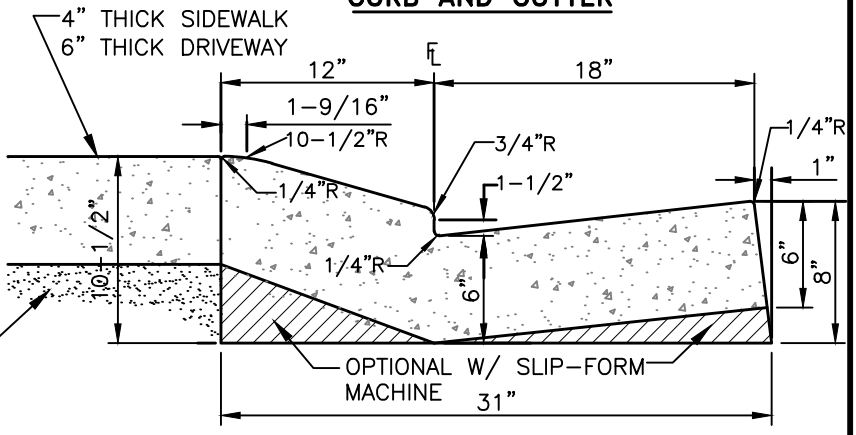
(OPTIONAL WITH 6" VERTICAL CURB)



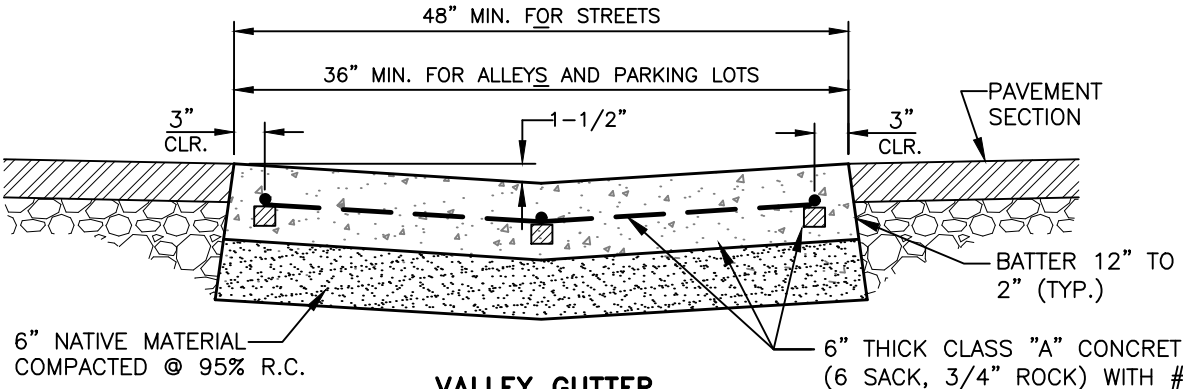
CURB AND GUTTER



VERTICAL CURB



4-1/2" DRIVE OVER CURB



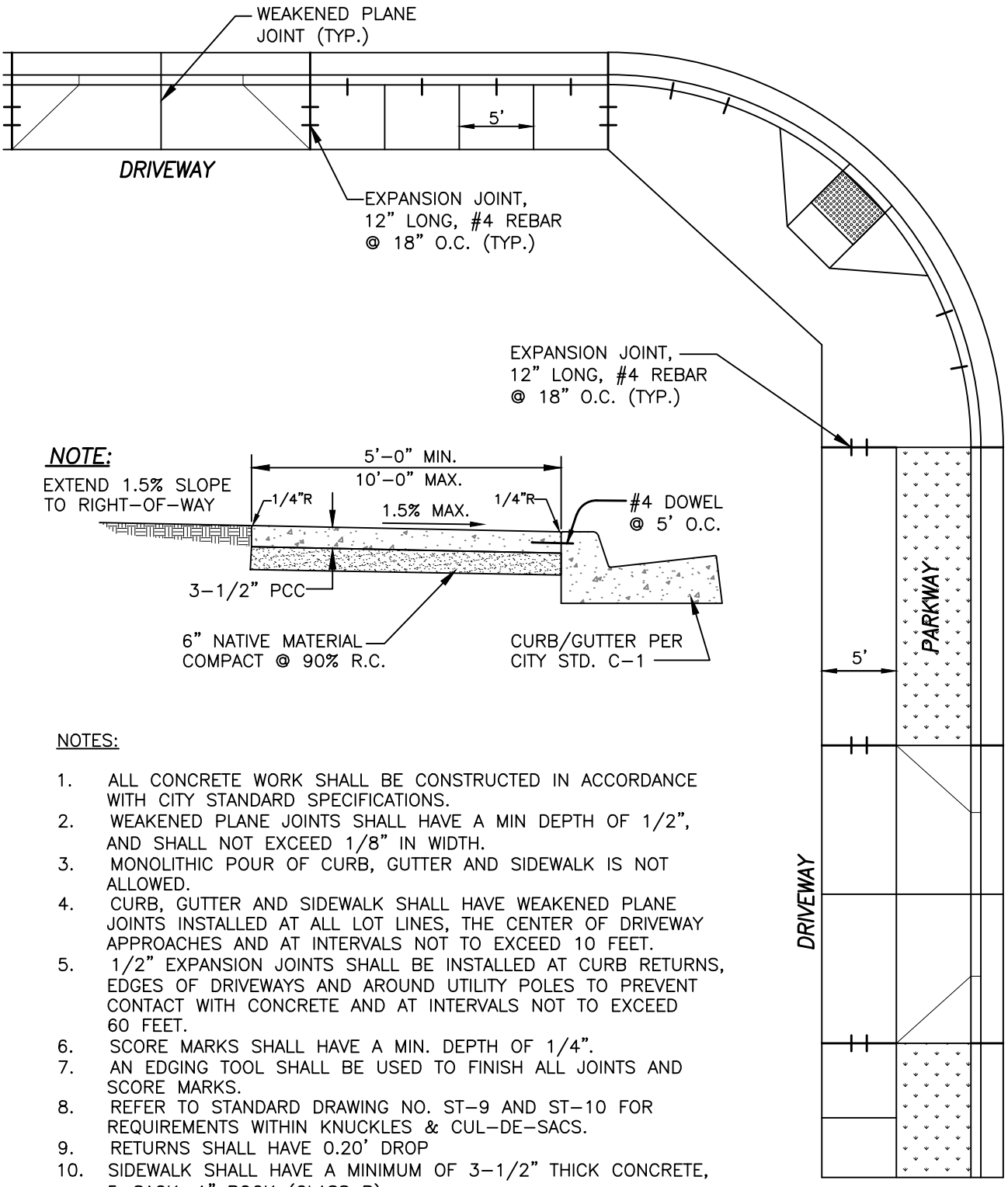
VALLEY GUTTER

NOTES:

1. INSTALL WEAKENED PLANE JOINT AT 10' INTERVALS
2. GUTTER FLOW LINES SHALL BE WATER TESTED FOR FLOW
3. FLOW LINE OF GUTTERS SHALL SLOPE AT 0.20% MIN, UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
4. FOR MEDIANS USE 8" VERTICAL CURB.
5. CURB & GUTTER CONCRETE SHALL BE STATE CLASS "B" (5 SACK, 1" ROCK).
6. PROVIDE ½" EXPANSION JOINTS AT 60'-0" O.C.

CURB AND GUTTER STANDARDS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: C-1
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

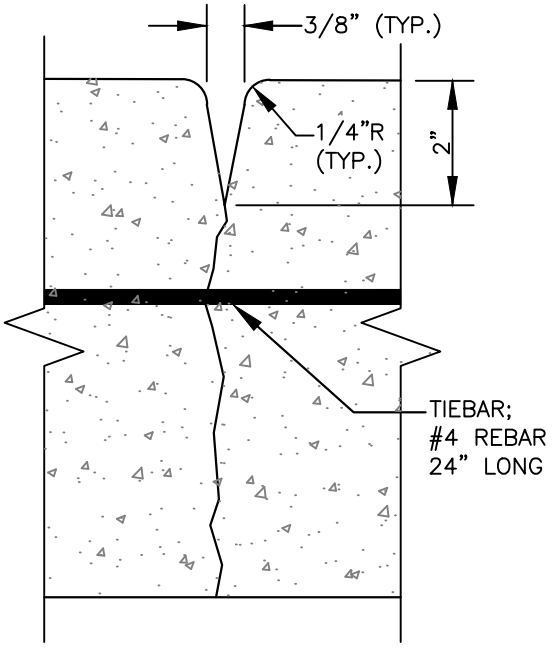


NOTES:

1. ALL CONCRETE WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY STANDARD SPECIFICATIONS.
2. WEAKENED PLANE JOINTS SHALL HAVE A MIN DEPTH OF 1/2", AND SHALL NOT EXCEED 1/8" IN WIDTH.
3. MONOLITHIC POUR OF CURB, GUTTER AND SIDEWALK IS NOT ALLOWED.
4. CURB, GUTTER AND SIDEWALK SHALL HAVE WEAKENED PLANE JOINTS INSTALLED AT ALL LOT LINES, THE CENTER OF DRIVEWAY APPROACHES AND AT INTERVALS NOT TO EXCEED 10 FEET.
5. 1/2" EXPANSION JOINTS SHALL BE INSTALLED AT CURB RETURNS, EDGES OF DRIVEWAYS AND AROUND UTILITY POLES TO PREVENT CONTACT WITH CONCRETE AND AT INTERVALS NOT TO EXCEED 60 FEET.
6. SCORE MARKS SHALL HAVE A MIN. DEPTH OF 1/4".
7. AN EDGING TOOL SHALL BE USED TO FINISH ALL JOINTS AND SCORE MARKS.
8. REFER TO STANDARD DRAWING NO. ST-9 AND ST-10 FOR REQUIREMENTS WITHIN KNUCKLES & CUL-DE-SACS.
9. RETURNS SHALL HAVE 0.20' DROP
10. SIDEWALK SHALL HAVE A MINIMUM OF 3-1/2" THICK CONCRETE, 5-SACK, 1" ROCK (CLASS B).

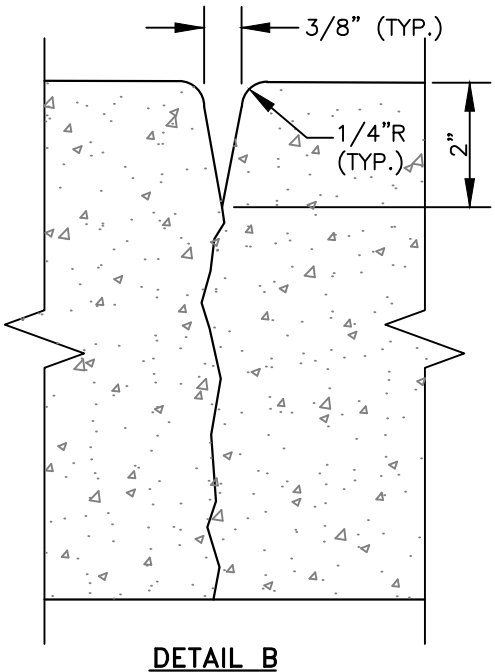
SIDEWALK STANDARDS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: C-2
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



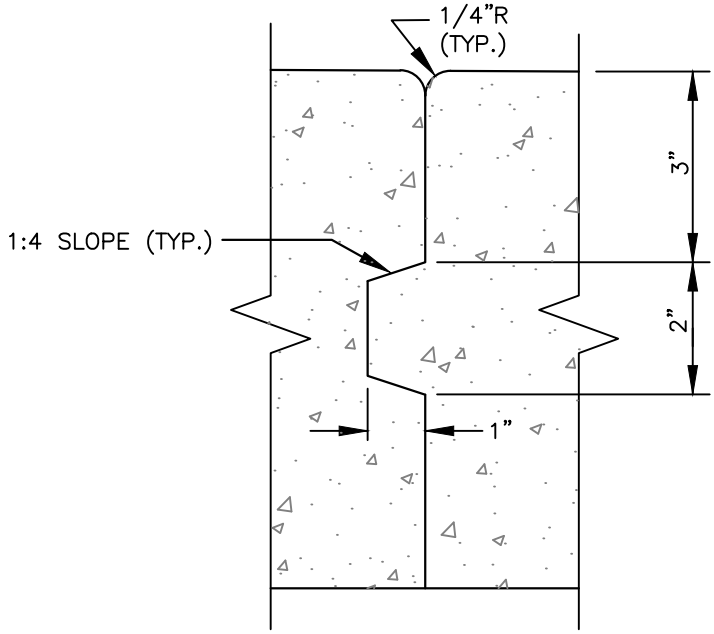
DETAIL A

TYPICAL TIED CONTROL JOINT



DETAIL B

TYPICAL CONTROL JOINT

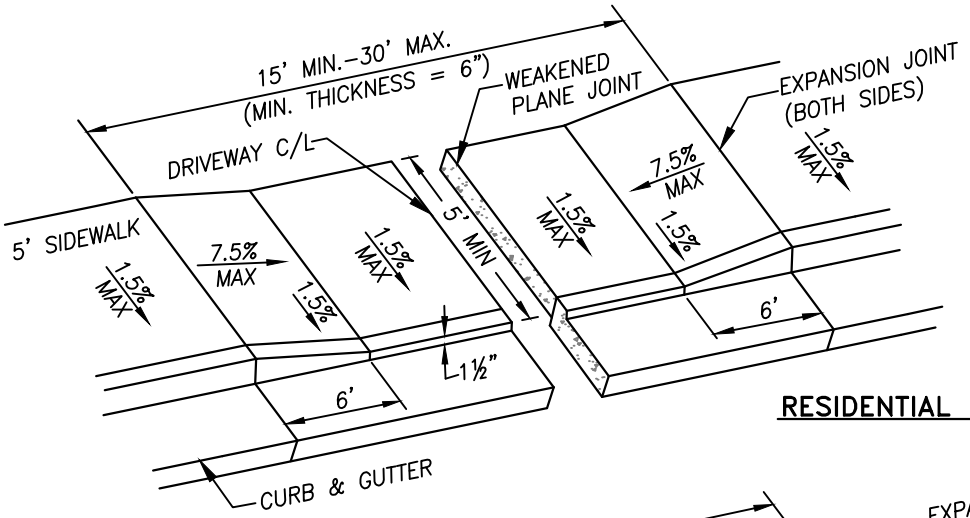


DETAIL C

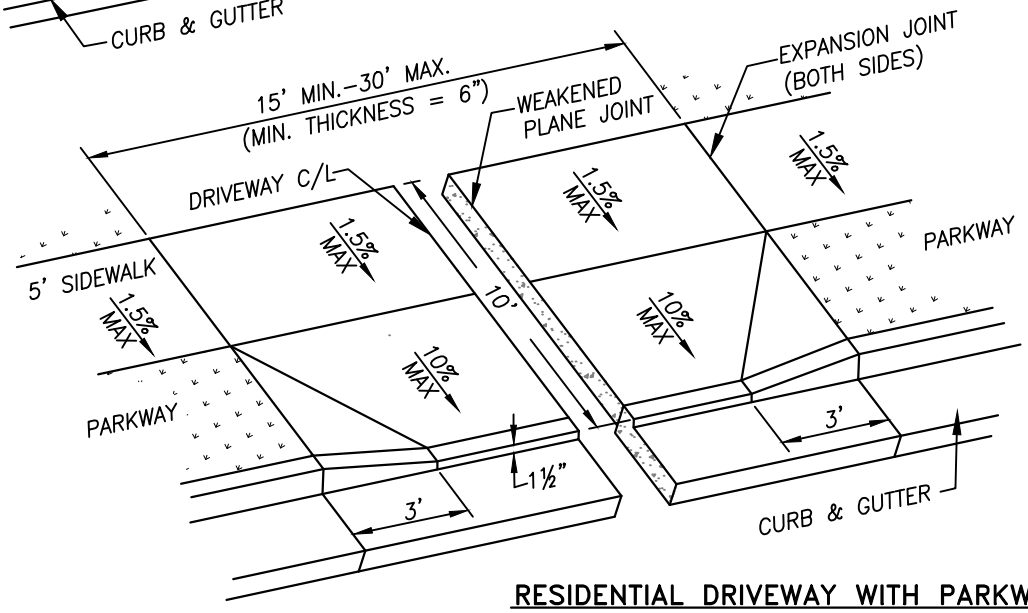
FOR USE AT ALL COLD JOINTS
(NON CONTINUOUS POURS)

CONTROL JOINT DETAILS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C–3 COUNCIL APPROVAL DATE DATE 03/26/2018



RESIDENTIAL DRIVEWAY



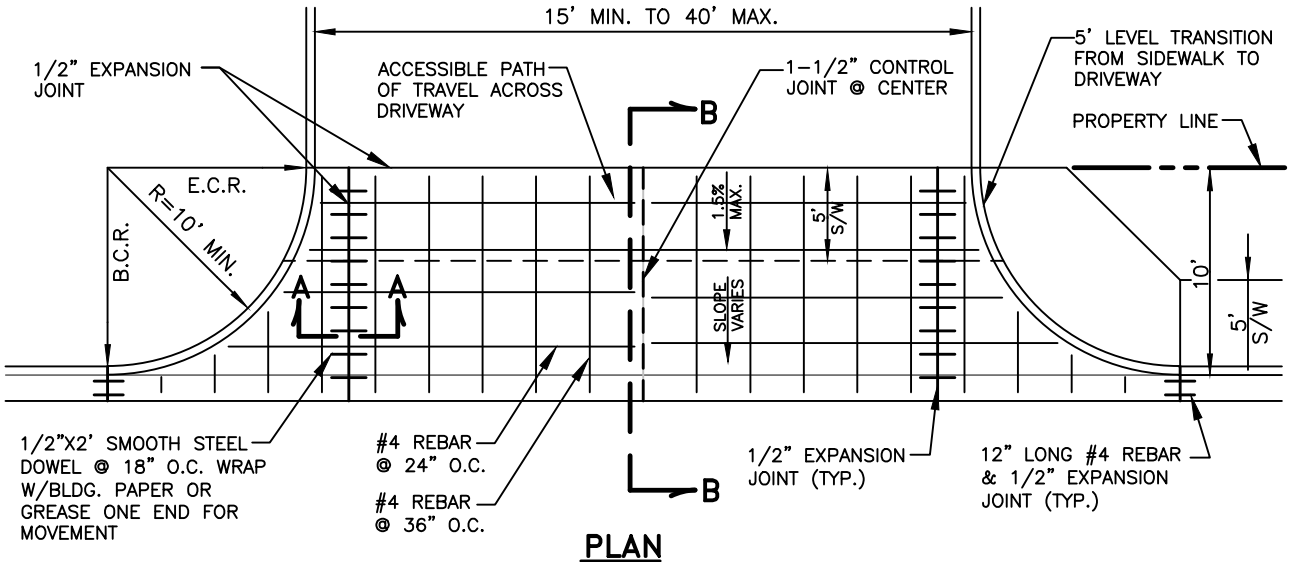
RESIDENTIAL DRIVEWAY WITH PARKWAY

NOTES:

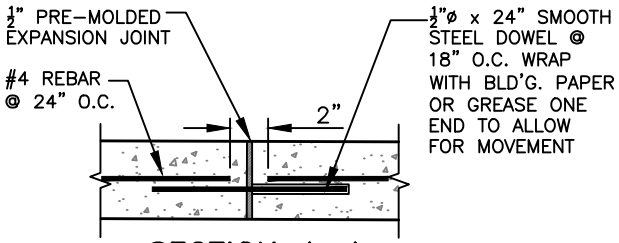
1. SUB–GRADE COMPACTION SHALL BE 95%.
2. CONCRETE SURFACE SHALL BE TROWELED SMOOTH & HAIR BROOMED.
3. CONCRETE CURING SHALL BE PER CURRENT CALTRANS SPECIFICATIONS.
4. GUTTER FLOW LINE SHALL BE WATER TESTED FOR FLOW.
5. PROVIDE A WEAKENED PLANE JOINT OF 1–1/2" MINIMUM DEPTH AND 1/8" MAX, WIDTH.
6. INSTALL EXPANSION JOINTS AT EDGES OF DRIVEWAY.
7. MONOLITHIC POUR OF CURB, GUTTER, SIDEWALK AND DRIVEWAY IS NOT ALLOWED.
8. CONCRETE WORK SHALL BE CLASS "B" CONCRETE (5 SACK MIX) AND 6 INCHES MINIMUM THICKNESS.
9. DRIVEWAYS SHALL BE LOCATED AT LEAST 20 FEET FROM THE END OF CURB RETURNS.

RESIDENTIAL DRIVEWAY APPROACH

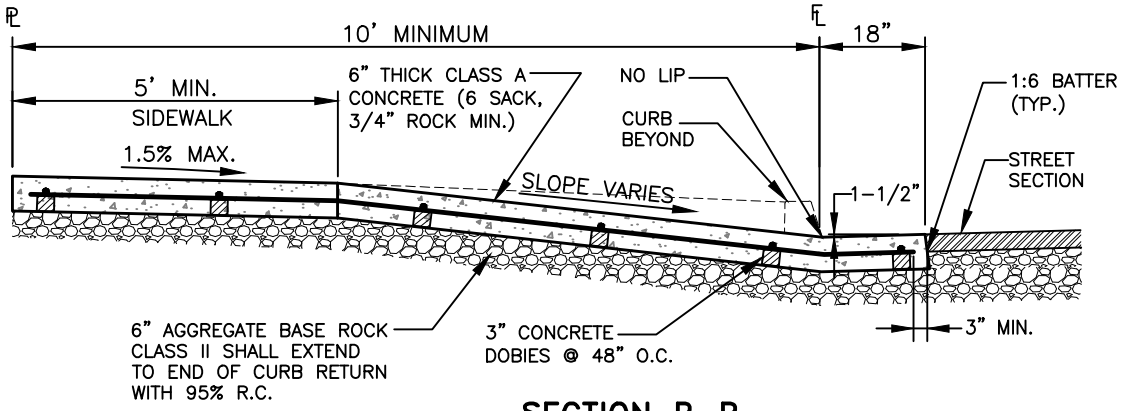
CITY OF CERES – TOGETHER WE ACHIEVE	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C–4 COUNCIL APPROVAL DATE DATE 03/26/2018



PLAN



SECTION A-A



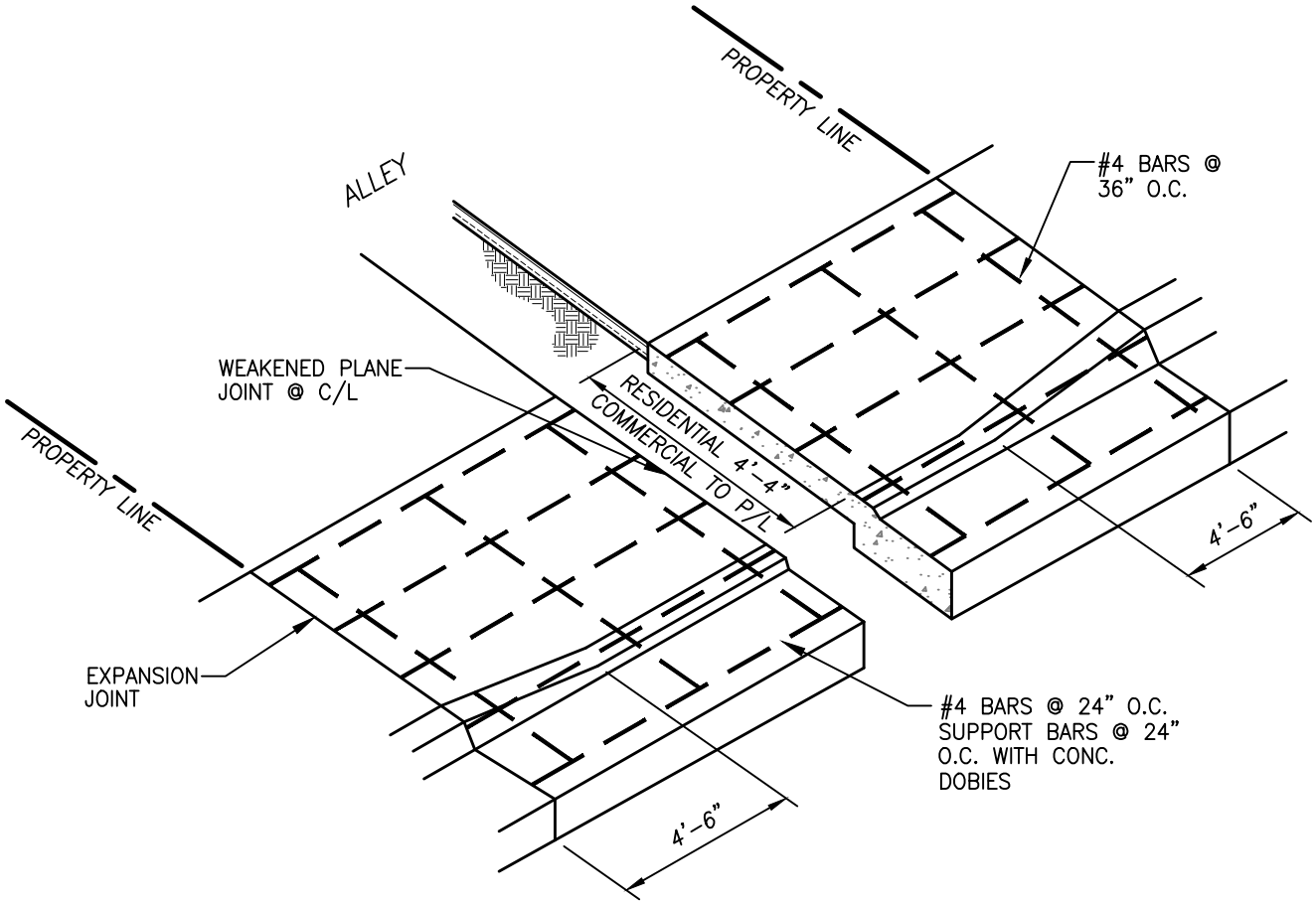
SECTION B-B

NOTES:

1. SUB-GRADE COMPACTION SHALL BE 95%.
2. CONCRETE SURFACE SHALL BE TROWELED SMOOTH & HAIR BROOMED FINISH.
3. CONCRETE CURING SHALL BE PER CURRENT CALTRANS SPECIFICATIONS.
4. GUTTER FLOW LINE SHALL BE WATER TESTED FOR FLOW.
5. PROVIDE A WEAKENED PLANE JOINT OF 1-1/2" MINIMUM DEPTH AND 1/8" MAXIMUM WIDTH IN THE MIDDLE OF THE DRIVEWAY APPROACH AND GUTTER.
6. MULTI FAMILY UNITS SHALL USE THIS APPROACH.
7. DRIVEWAYS OVER 40' WIDE MUST BE APPROVED BY THE CITY ENGINEER.
8. UP TO 1-1/2" GUTTER LIP MAY BE PROJECTED THROUGH DRIVEWAY WITH CITY ENGINEERS APPROVAL.

COMMERCIAL/INDUSTRIAL DRIVEWAY APPROACH

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: C-5
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

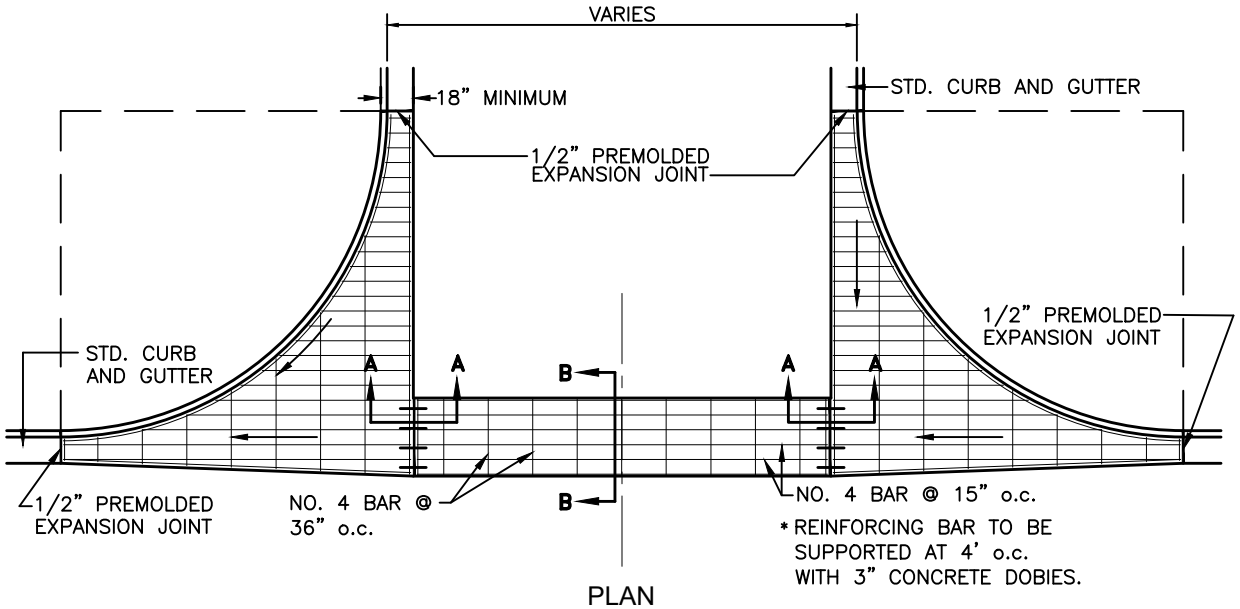


NOTES:

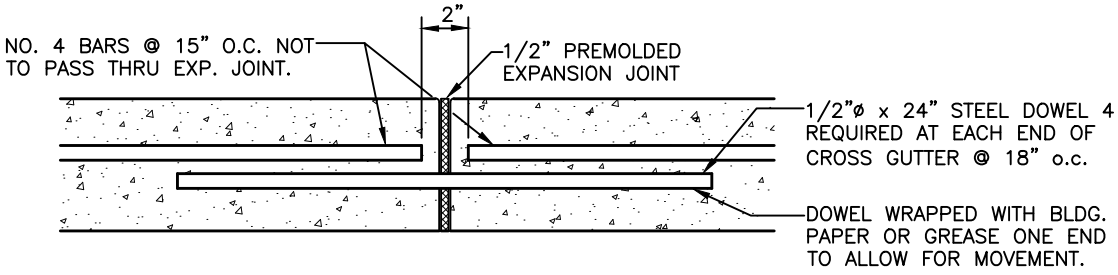
1. COMMERCIAL ALLEYS SHALL HAVE A SLOPE OF 1% MIN. AND A CROSS SLOPE OF 2% MAX.
2. ALL ALLEY APPROACHES SHALL HAVE A MINIMUM THICKNESS OF 6".
3. CONCRETE WORK SHALL BE CLASS "A" CONCRETE (6 SACK, 1–1/2" ROCK).
4. SUB–GRADE COMPACTION SHALL BE @ 95% R.C.
5. GUTTER FLOW LINE & VALLEY GUTTER SHALL BE WATER TESTED FOR FLOW.
6. FINISH GRADE AT BACK OF DRIVEWAY SHALL MATCH ALLEY PAVEMENT.
7. WEAKENED PLANE JOINT SHALL BE 1–1/2" MIN. DEPTH AND 1/8" MAX. WIDTH.
8. MONOLITHIC POUR OF CURB, GUTTER & DRIVEWAY IS NOT ALLOWED.

ALLEY DRIVEWAY APPROACH

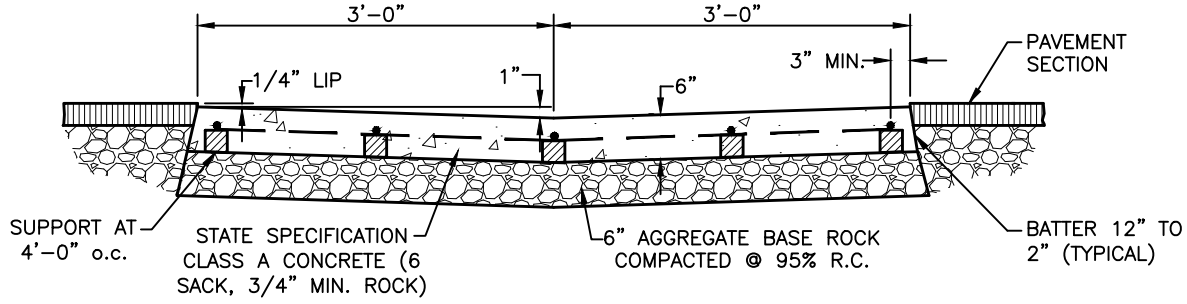
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C–6 COUNCIL APPROVAL DATE DATE 03/26/2018



PLAN



SECTION A-A



SECTION B-B

NOTES:

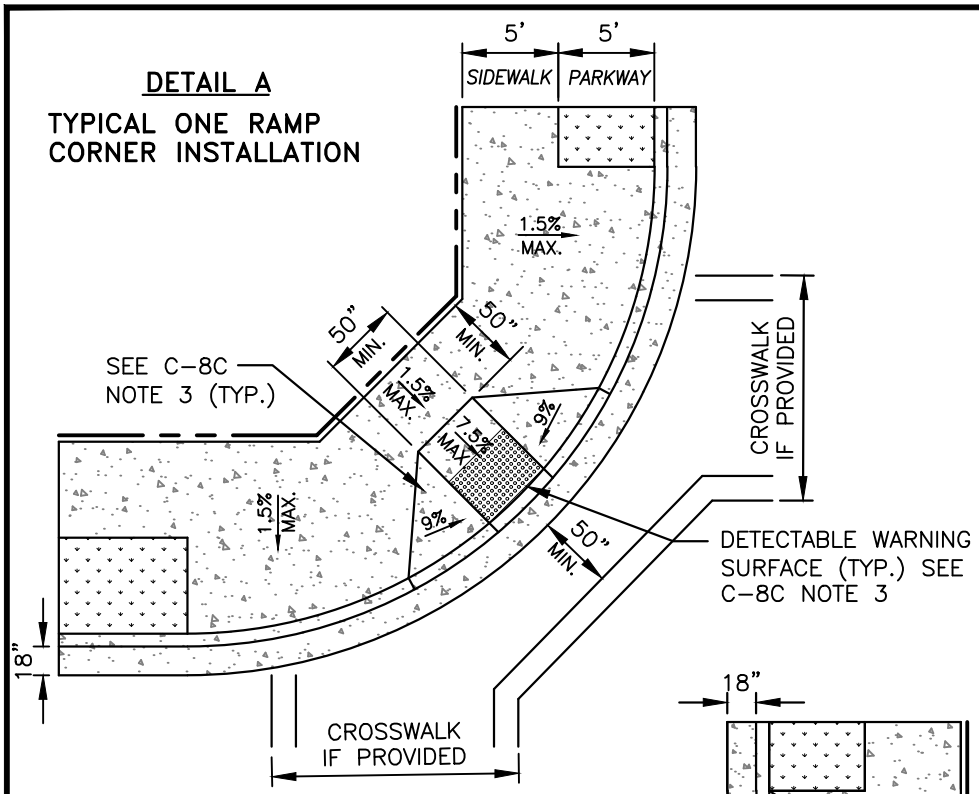
1. AGGREGATE BASE TO EXTEND TO ENDS OF CURB RETURNS (95% RELATIVE COMPACTION).
2. CROSS GUTTER SHALL HAVE 0.40 FEET MIN. FALL BETWEEN ENDS OF RETURNS, OR S=.005 WHEN LENGTH BETWEEN ENDS OF RETURNS IS MORE THAN 90 FEET.

CROSS GUTTER DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C-7 COUNCIL APPROVAL DATE DATE 03/26/2018

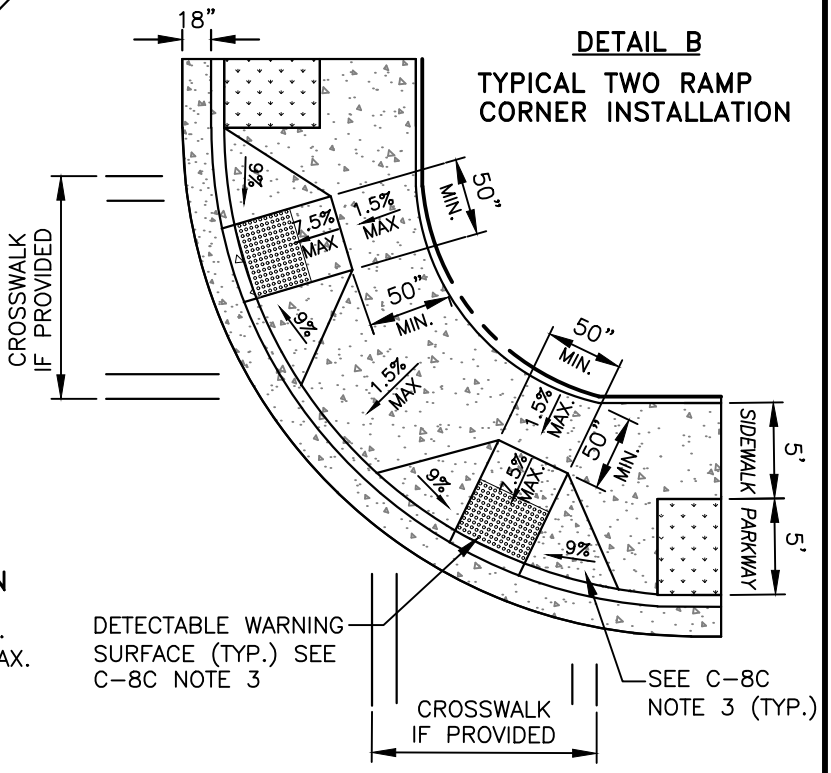
DETAIL A

TYPICAL ONE RAMP
CORNER INSTALLATION



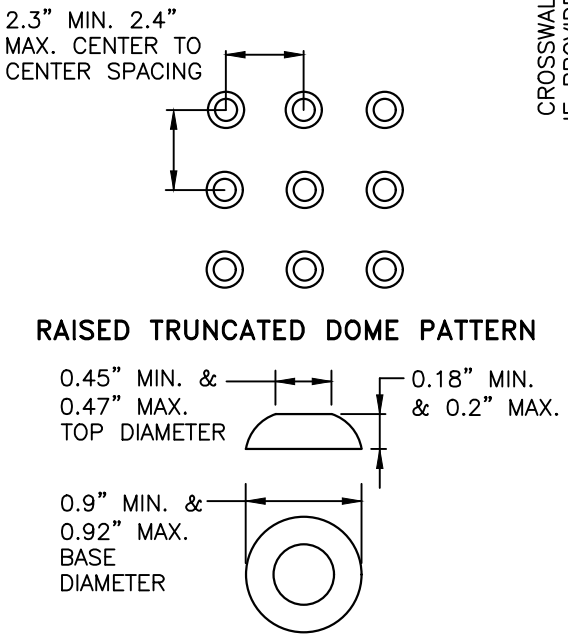
DETAIL B

TYPICAL TWO RAMP
CORNER INSTALLATION



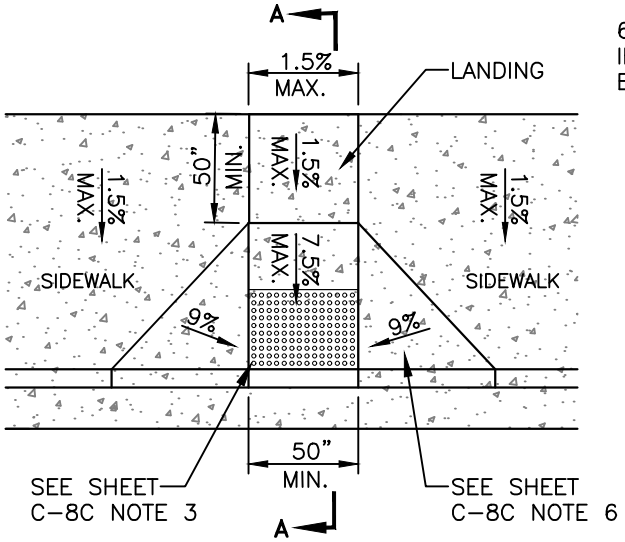
DETAIL C

DETECTABLE WARNING SURFACE

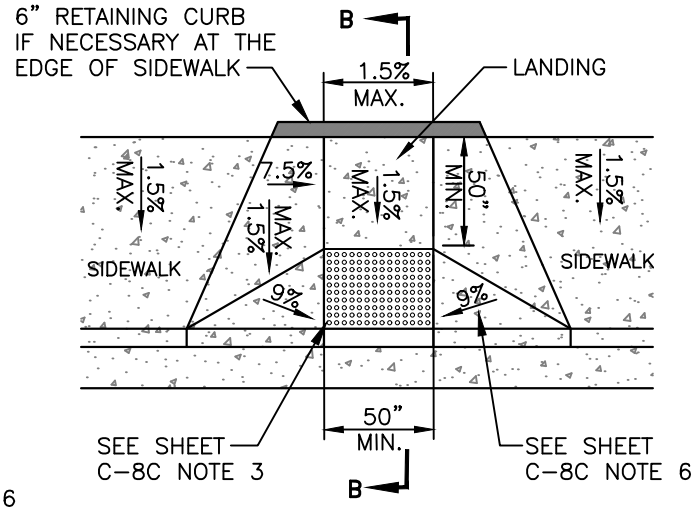


PEDESTRIAN ADA CURB RAMP – CORNER INSTALATION

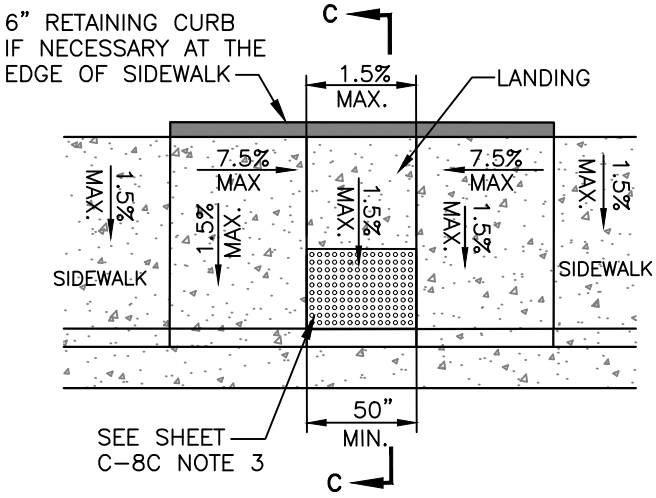
CITY OF CERES – TOGETHER WE ACHIEVE	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C-8A COUNCIL APPROVAL DATE DATE 03/26/2018



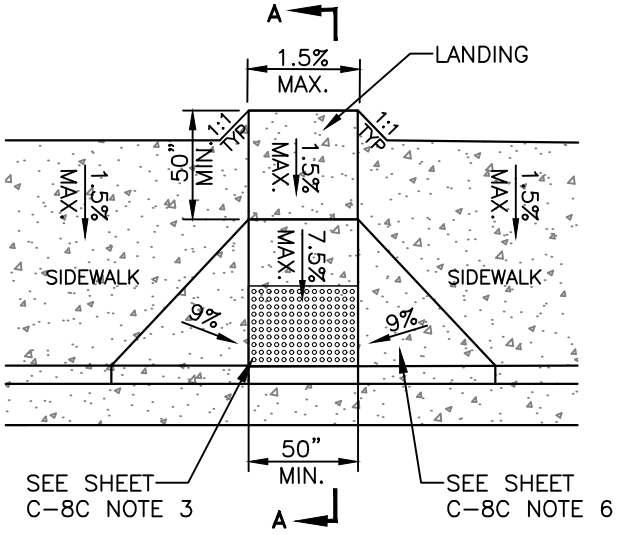
CASE A



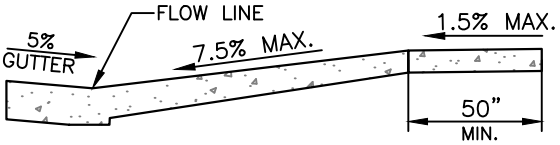
CASE B



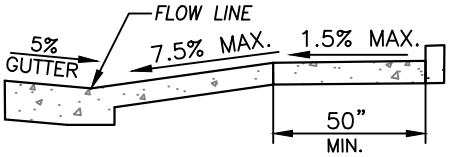
CASE C



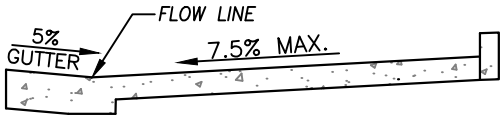
CASE D



SECTION A–A



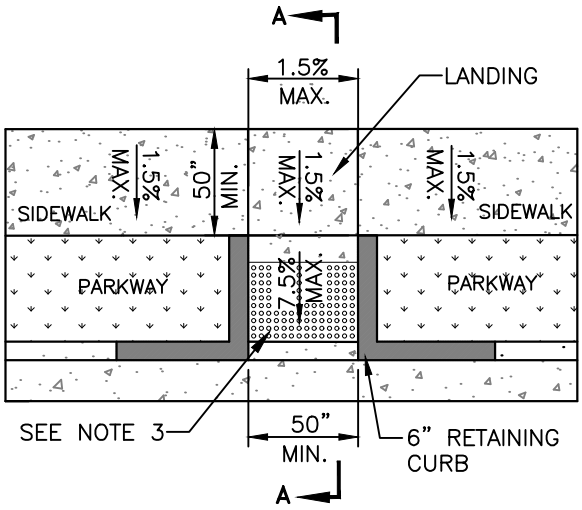
SECTION B–B



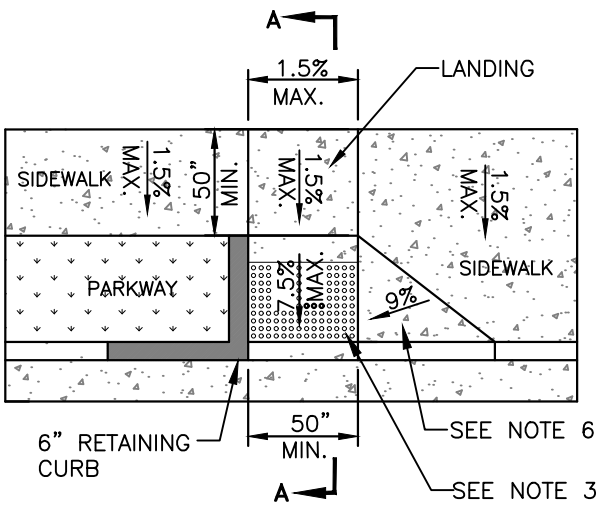
SECTION C–C

PEDESTRIAN ADA CURB RAMP – CASES

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C-8B COUNCIL APPROVAL DATE DATE 03/26/2018



CASE E



CASE F

NOTES:

1. AS SITE CONDITIONS DICTATE, CASE A THROUGH F CURB RAMPS MAY BE USED FOR INSTALLATION SIMILAR TO THOSE SHOWN ON C–8A DETAIL A AND DETAIL B.

2. WHEN RAMP IS LOCATED IN CENTER OF CURB RETURN, CROSSWALK CONFIGURATION MUST BE SIMILAR TO THAT SHOWN ON C–8A DETAIL B.

3. ALL CURB RAMPS SHALL HAVE DETECTABLE WARNING SURFACE THAT EXTENDS THE FULL WIDTH AND 3' DEPTH OF THE RAMP. A 4' WIDE DETECTABLE WARNING SURFACE MAY BE USED ON A 4'–2" WIDE CURB RAMP. DETECTABLE WARNING SURFACE SHALL CONFORM TO THE REQUIREMENTS IN THE STANDARD SPECIFICATIONS C–8A DETAIL C.

4. DETECTABLE WARNING SURFACE MAY HAVE TO BE CUT TO ALLOW REMOVAL OF UTILITY COVERS WHILE MAINTAINING FULL DETECTABLE WARNING WIDTH AND DEPTH.

5. AS SITE CONDITION DICTATE, THE RETAINING CURB AND THE FLARED SIDE OF THE CASE RAMP SHALL BE CONSTRUCTED IN REVERSED POSITION.

6. SIDE SLOPES OF RAMP FLARES VARY UNIFORMLY FROM A MAXIMUM OF 9.0% AT CURB TO CONFORM WITH LONGITUDINAL SIDEWALK SLOPES ADJACENT TO TOP OF THE RAMP, EXCEPT IN CASE D AND E.

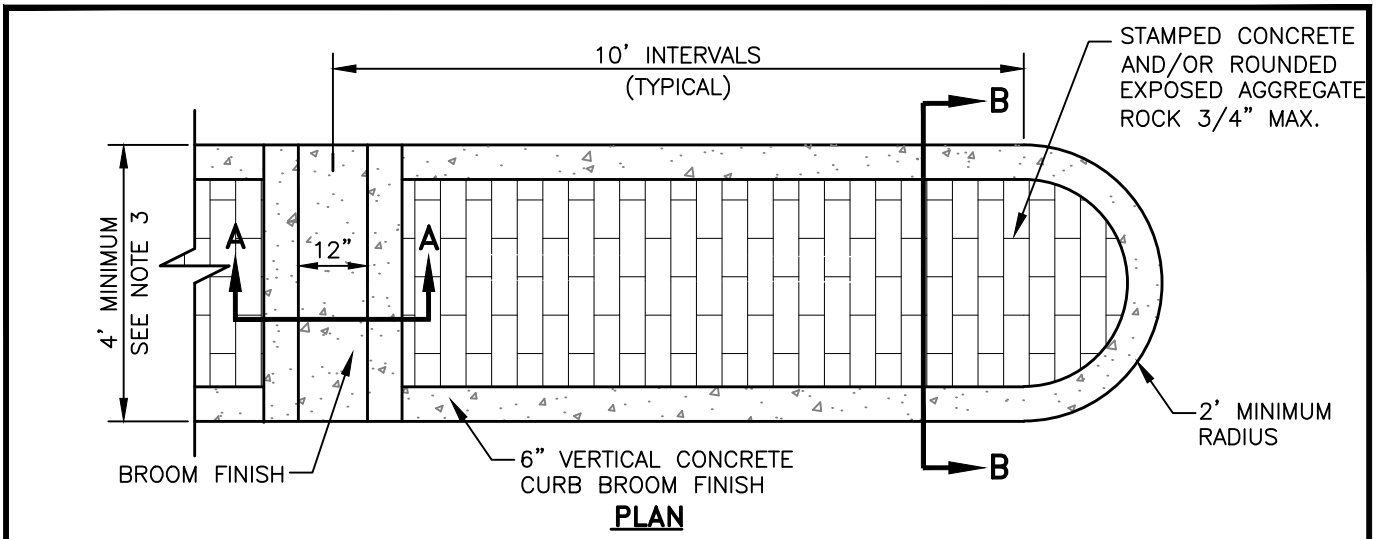
7. IF DISTANCE FROM CURB TO BACK OF SIDEWALK IS TOO SHORT TO ACCOMMODATE RAMP AND 4'–2" LANDING AS SHOWN IN CASE A, THE SIDEWALK MAY BE DEPRESSED LONGITUDINALLY AS IN CASE C, OR D OR IT MAY BE WIDENED AS IN CASE B.

9. RAMPS SHALL HAVE A MINIMUM CONCRETE THICKNESS OF 6", 5–SACK, 1" ROCK (CLASS B).

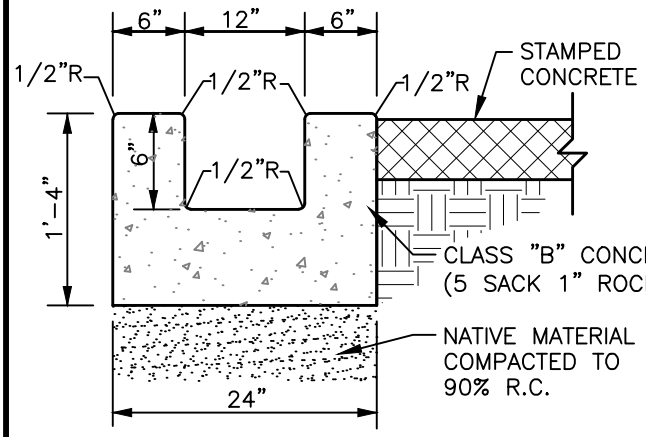
10. COUNTER SLOPES OF ADJOINING GUTTERS AND ROAD SURFACES IMMEDIATELY ADJACENT TO AND WITHIN 24 INCHES OF THE CURB RAMP SHALL NOT BE STEEPER THAN 5.0%.

PEDESTRIAN ADA CURB RAMP – CASES

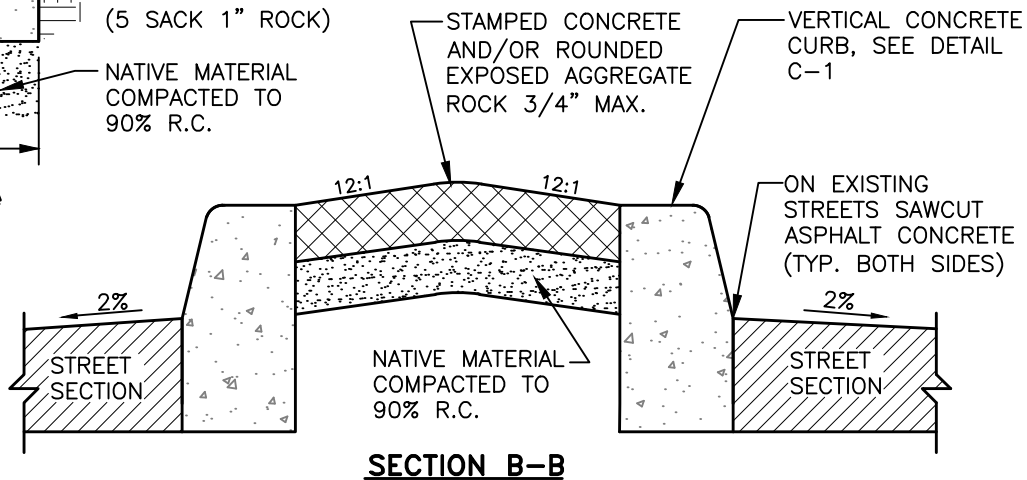
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C–8C COUNCIL APPROVAL DATE DATE 03/26/2018



PLAN



SECTION A–A



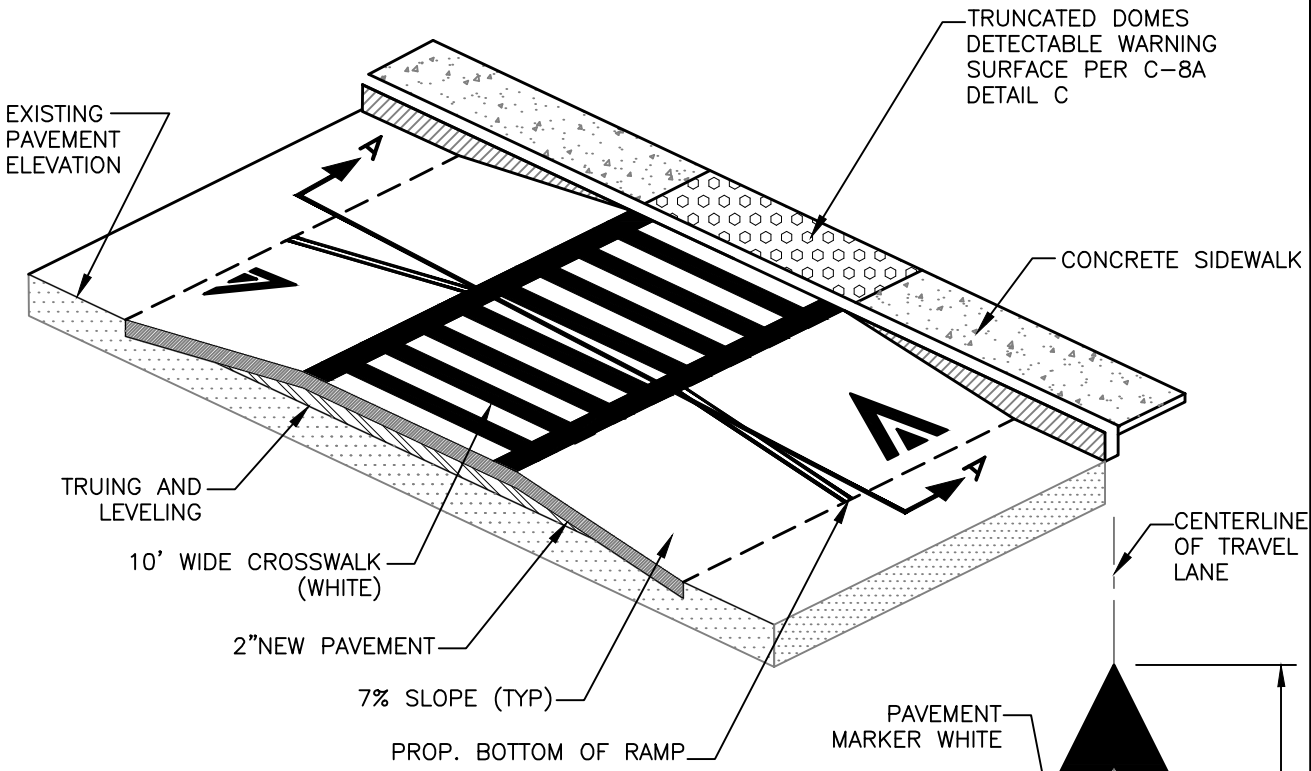
SECTION B–B

NOTES:

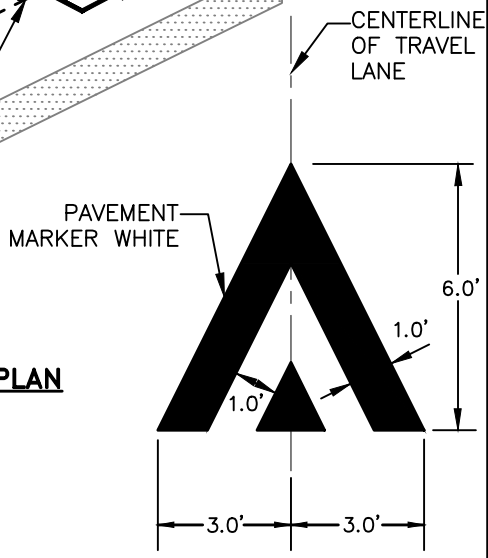
1. PROVIDE WEAKENED PLANE JOINTS AT MAX 10' AND AT END OF RETURNS.
2. MEDIANS GREATER THAN 6–FEET SHALL BE LANDSCAPED.
3. MEDIANS SHALL BE CONTINUOUS FROM START AT AN INTERSECTION FOR A MINIMUM DISTANCE OF 300 FEET. ALL DRIVEWAYS WITHIN THIS DISTANCE SHALL BE RIGHT–IN AND RIGHT–OUT ONLY. MEDIANS SHALL EXTEND A MINIMUM OF 100 FEET FROM THE FURTHEST EDGE OF ANY DRIVEWAY LOCATED WITHIN THE FIRST 300 FEET OF A STREET MEASURED FROM THE START POINT OF THE MEDIAN AT AN INTERSECTION.
4. MEDIANS ON MAJOR ROADS AND ABOVE WITH LESS THAN 6–FEET IN WIDTH SHALL BE PAVED WITH COLORED STAMPED CONCRETE WITHOUT 12–INCH BROOM FINISH AREAS.
5. REFER TO STANDARD PLATE DETAIL C–1 FOR 6" MEDIAN VERTICAL CURB DETAIL

RAISED CENTER MEDIAN DETAIL

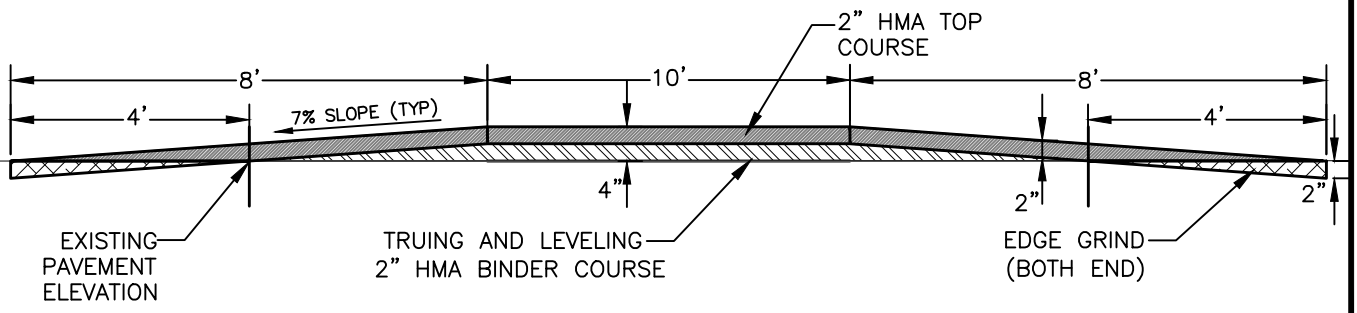
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C–9 COUNCIL APPROVAL DATE DATE 03/26/2018



RAISED CROSSWALK ISOMETRIC PLAN



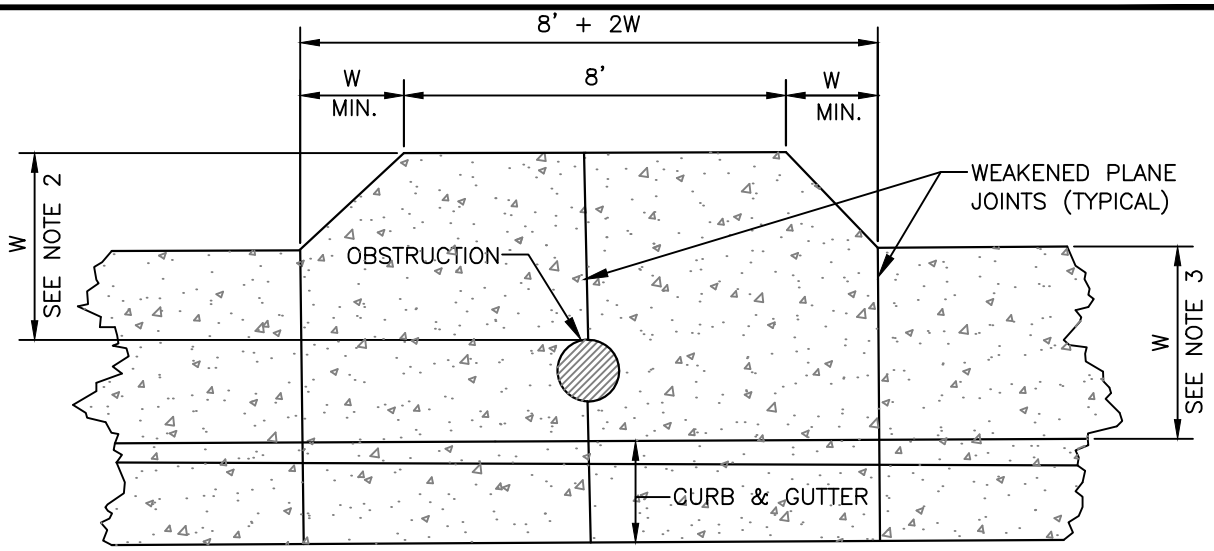
RAMP MARKING DETAIL



SECTION A-A

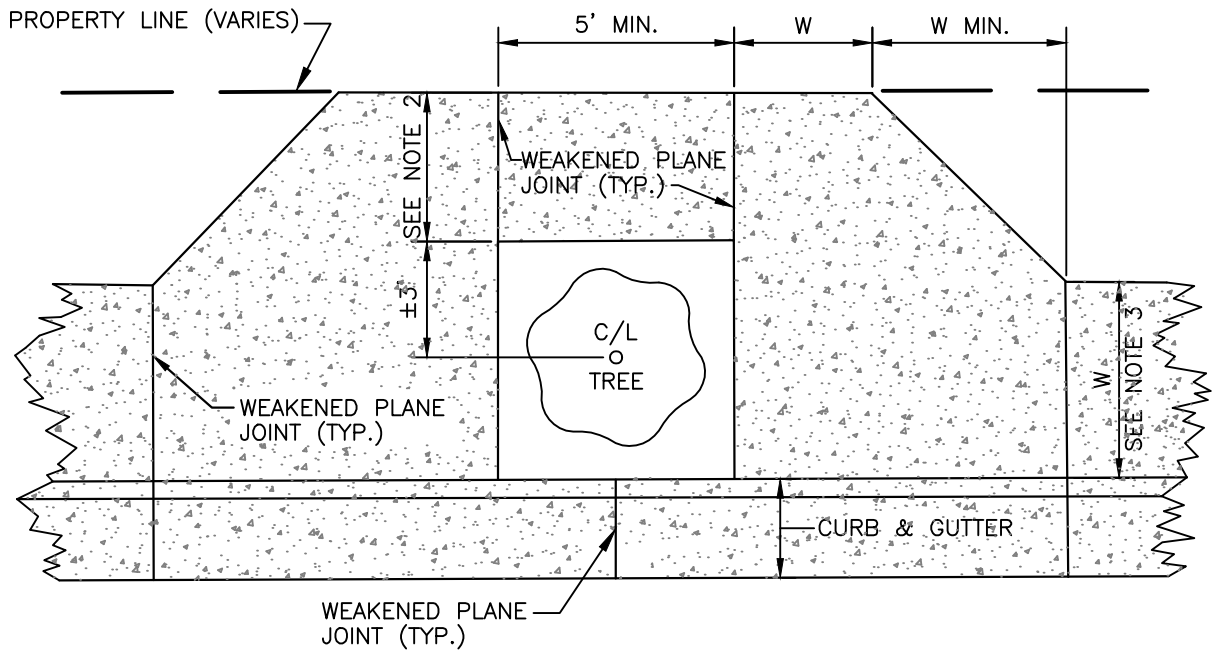
RAISED CROSSWALK

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: C-10
CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



NOTES:

1. NO WIDENING IS NEEDED WHEN SPACE BETWEEN BACK OF CURB AND FACE OF OBSTRUCTION IS 36" OR MORE.
2. BACK OF WIDENED SIDEWALK SHALL REMAIN WITHIN THE STREET RIGHT OF WAY.
3. W = PROPOSED OR EXISTING SIDEWALK WIDTH.



NOTES:

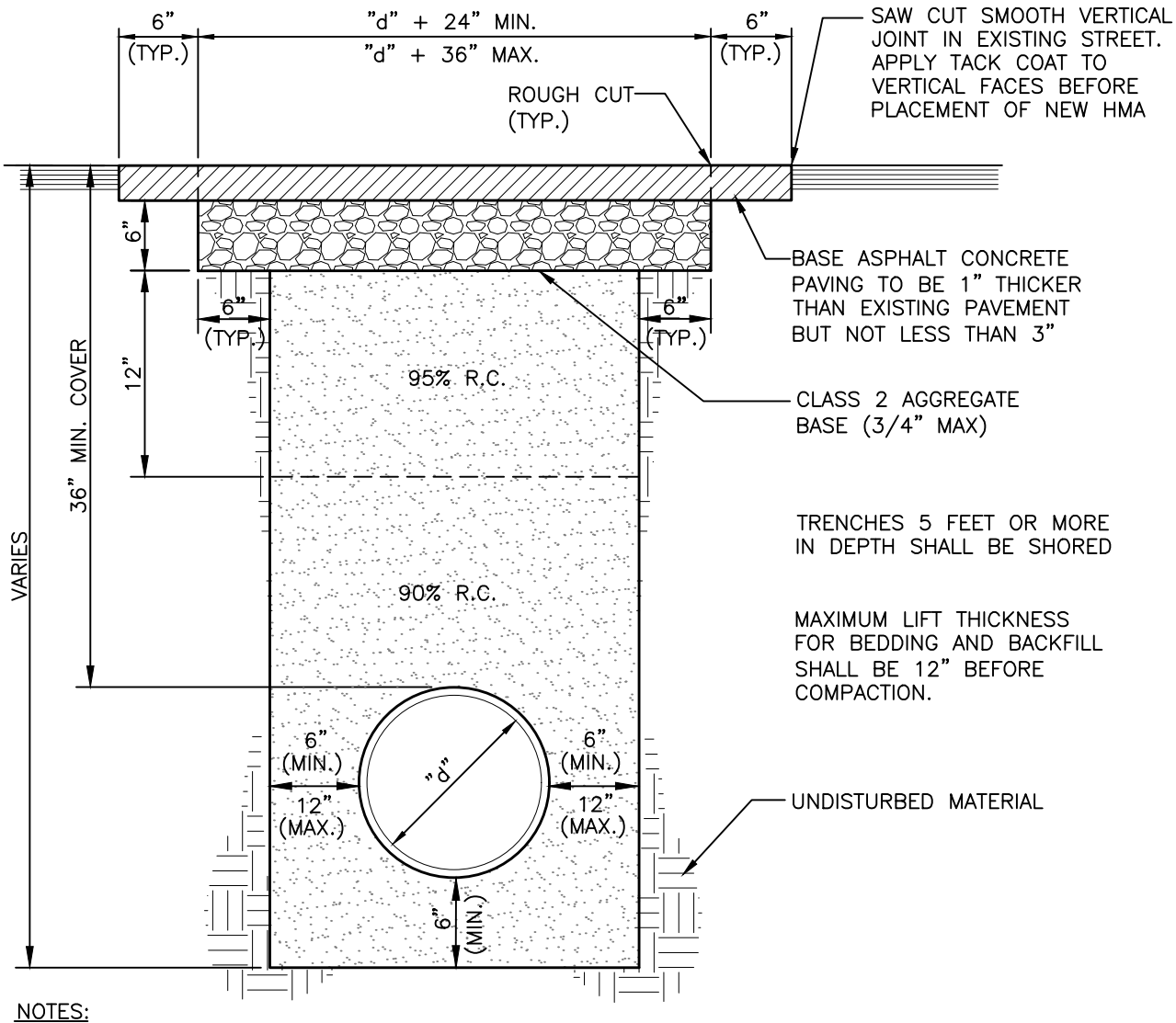
1. TREE ROOTS ARE TO BE CUT AT EDGE OF WALK TO 10" BELOW FINISH GRADE, AS DETERMINED BY THE CITY ENGINEER.
2. THE DISTANCE BETWEEN THE BACK OF THE TREE BLOCK-OUT AND THE BACK OF THE SIDEWALK SHALL BE A MINIMUM OF 42".
3. W = PROPOSED OR EXISTING SIDEWALK WIDTH.

SIDEWALK WIDENING FOR OBSTRUCTION

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: C-11 COUNCIL APPROVAL DATE DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

TRENCHING AND BACKFILLING



NOTES:

1. ALL BACKFILLED TRENCHES SHALL BE PAVED WITH TEMPORARY A.C. PAVEMENT AS DIRECTED IN THE FIELD, BY THE CITY ENGINEER, UNTIL PERMANENT PAVEMENT IS PLACED.
2. BACKFILL SHALL BE NATIVE WITH COMPACTION TESTS, EXCEPT AS PROVIDED IN NOTE NO. 4.
3. COMPACTION TESTS SHALL BE APPROVED BY THE CITY BEFORE PAVING.
4. TRENCHES WHICH ARE 30" IN DEPTH OR LESS THAN 18" IN WIDTH OR LESS, SHALL BE BACKFILLED WITH TWO SACK CEMENT SLURRY.
5. IN LIEU OF COMPACTION TESTS, BACKFILL MAY BE TWO SACK CEMENT SLURRY.
6. IN CASE OF REPAIRING A SECTION OF PIPE, ALL STEPS OF TRENCHING SHALL BE REPEATED.
7. THE MAXIMUM WIDTH AT TOP OF THE PIPE SHALL BE EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS 36" FOR PIPE DIAMETERS OF 18" & LARGER. AND TO THE OUTSIDE DIAMETER OF THE PIPE PLUS 24" FOR PIPE DIAMTER LESS THAN 18".

TYPICAL TRENCH EXCAVATION AND BACKFILLING

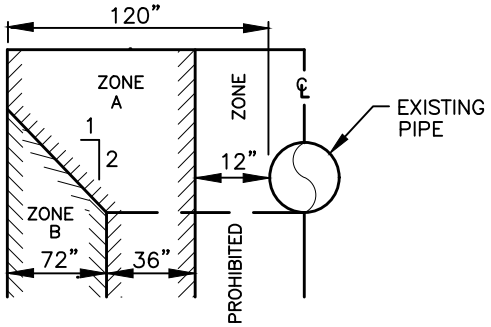
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: T-1 COUNCIL APPROVAL DATE DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

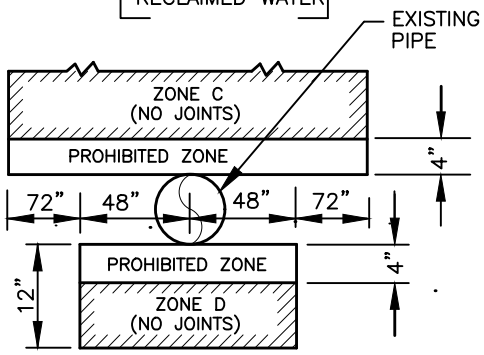
WATER SYSTEMS

W-01A	Requirements for Wet Utilities Separation
W-01B	General Notes Wet Utilities Separation
W-02A	New Water Service Connection, 1 Inch
W-02B	New Water Service Connection, 1-1/2 Inch
W-02C	New Water Service Connection, 2 Inch
W-02D	New Water Service Connection, 3 Inch & Larger
W-03A	1 Inch Water Service Line Bullhead
W-03B	1-1/2 Inch Water Service Line Bullhead
W-03C	2 Inch Water Service Line Bullhead for 1 inch & 2 inch
W-03D	2 Inch Water Service Line Bullhead
W-03E	1 Inch Water & Fire Service - Residential
W-04A	Reduced Pressure Principle Assembly 3 inches and Larger
W-04B	Double Check Detector Assembly 3 inches and Larger
W-04C	Double Check Valve/Meter Assembly 3 inches and Larger
W-04D	Reduced Pressure Principle Backflow Assembly 1 inch through 2 inches
W-05	Fire Hydrant Assembly
W-06	Thrust Block Details
W-07	Water Valve Box Detail
W-08	Waterline Blowoff Assembly – Construction use only
W-09	Private Well Destruction Standard
W-10	Water Quality Sampling Station

SITUATION LOCATION OF NEW [SEWER / RECLAIMED WATER] LINES TO EXISTING [DOMESTIC WATER / RECLAIMED WATER] LINE.



PARALLEL CONSTRUCTION



PERPENDICULAR CONSTRUCTION

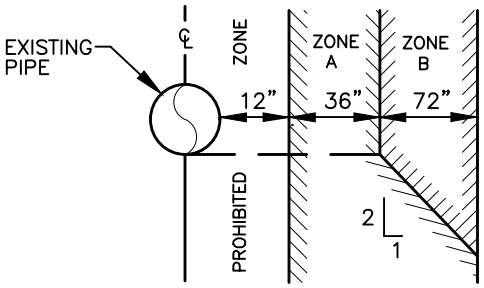
IF ANY SEWER OR RECLAIMED WATER PIPELINES ARE TO BE CONSTRUCTED WITHIN ANY OF THE ABOVE INDICATED ZONES, THEN SPECIAL CONSTRUCTION SHALL BE REQUIRED AS DESCRIBED BELOW.

CONSTRUCTION REQUIREMENTS

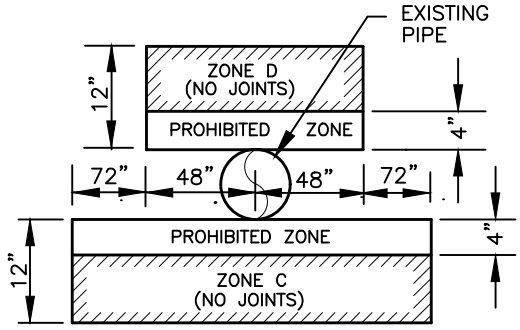
ZONE	NEW SEWER
A	DO NOT LOCATE ANY PARALLEL SEWER LINES IN THIS AREA WITHOUT STATE AND LOCAL HEALTH DEPARTMENT APPROVAL.
B	USE VCP, PVC SEWER PIPE WITH RUBBER RING JOINTS, OR DIP WITH COMPRESSION JOINTS.
C	USE DIP WITH MECHANICAL JOINTS OR PVC CLASS 200 – AWWA C900
D	USE DIP OR PVC CLASS 200 – AWWA C900

ZONE	NEW RECLAIMED WATER
A	DO NOT LOCATE ANY PARALLEL RECLAIMED WATER LINE IN THIS AREA WITHOUT STATE AND LOCAL HEALTH DEPARTMENT APPROVAL.
B	USE DIP OR PVC CLASS 200 – AWWA C900
C	USE DIP OR PVC CLASS 200 – AWWA C900
D	USE DIP OR PVC CLASS 200 – AWWA C900

SITUATION LOCATION OF NEW [DOMESTIC WATER / RECLAIMED WATER] LINES TO EXISTING [SEWER / RECLAIMED WATER] LINE.



PARALLEL CONSTRUCTION



PERPENDICULAR CONSTRUCTION

IF ANY WATER OR RECLAIMED WATER PIPELINES ARE TO BE CONSTRUCTED WITHIN ANY OF THE ABOVE INDICATED ZONES, THEN SPECIAL CONSTRUCTION SHALL BE REQUIRED AS DESCRIBED BELOW.

CONSTRUCTION REQUIREMENTS

ZONE	NEW DOMESTIC OR RECLAIMED WATER
A	DO NOT LOCATE ANY PARALLEL DOMESTIC WATER OR RECLAIMED WATER MAIN IN THIS AREA WITHOUT STATE AND LOCAL HEALTH DEPARTMENT APPROVAL.
B	USE DIP OR PVC CLASS 200 – AWWA C900
C	USE DIP OR PVC CLASS 200 – AWWA C900

REQUIREMENTS FOR WET UTILITIES SEPARATION

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W–1A COUNCIL APPROVAL DATE DATE 03/26/2018

BASIC SEPARATION STANDARDS

1. PARALLEL CONSTRUCTION: THE HORIZONTAL CLEAR DISTANCE BETWEEN PRESSURE DOMESTIC WATER AND RECLAIMED WATER MAINS AND SEWER LINES SHALL BE AT LEAST 120 INCHES CLEAR.

2. PERPENDICULAR CONSTRUCTION (CROSSING): PRESSURE WATER MAINS SHALL BE AT LEAST 12 INCHES CLEAR ABOVE SANITARY SEWER AND RECLAIMED WATER LINES WHERE THESE LINES MUST CROSS.

3. THE BASIC SEPARATION STANDARD ARE APPLICABLE UNDER NORMAL CONDITIONS FOR SEWER LINES AND WATER DISTRIBUTION LINES. MORE STRINGENT REQUIREMENTS AS DETERMINED BY THE STATE HEALTH DEPARTMENT MAY BE NECESSARY IF CONDITIONS, SUCH AS, HIGH GROUND WATER EXIST.

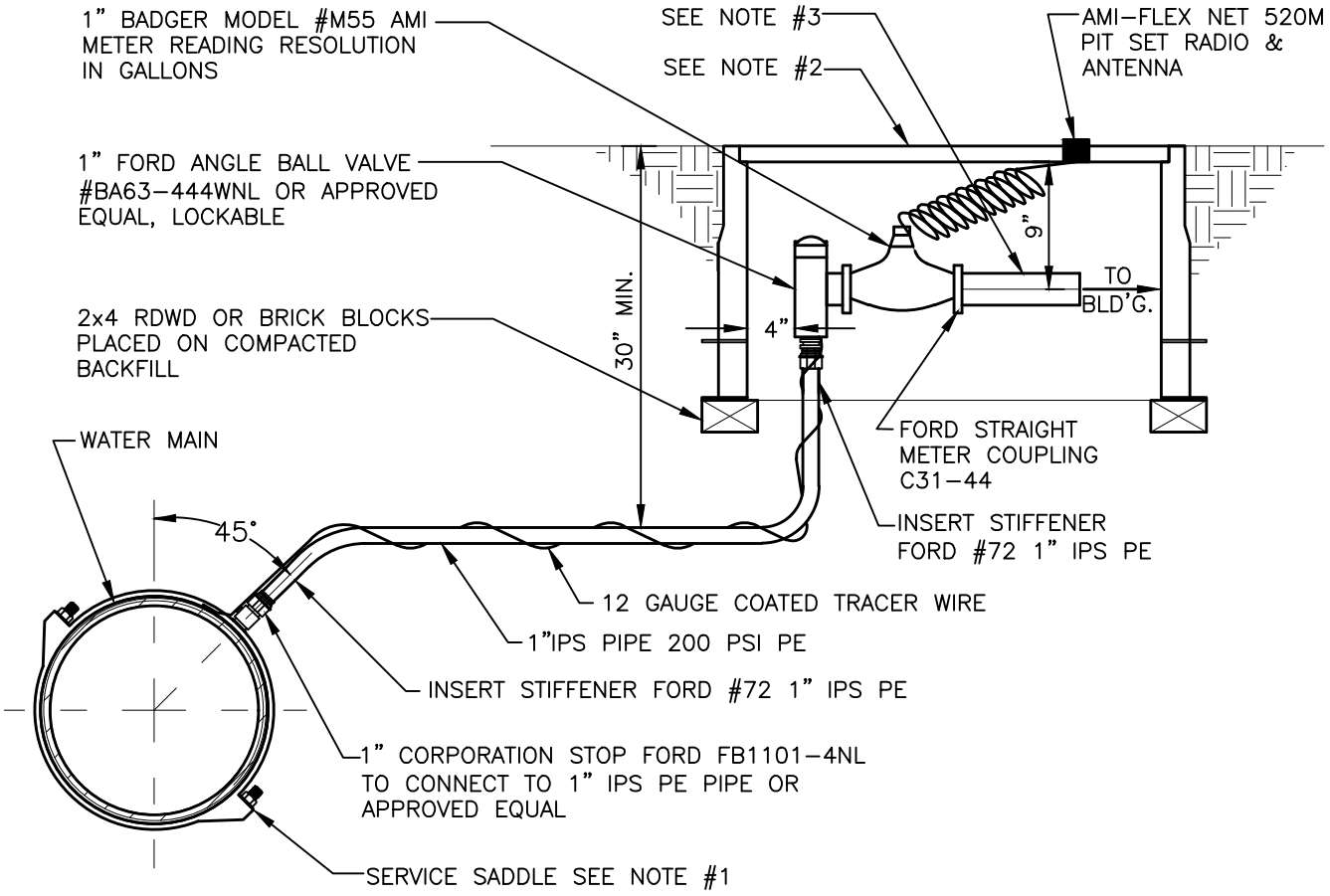
4. SPECIAL PROVISIONS: ALTERNATIVE CONSTRUCTION CRITERIA WHERE THE BASIC SEPARATION STANDARDS CANNOT BE ATTAINED ARE SHOWN BELOW AND ON STANDARD DETAIL W-1A.

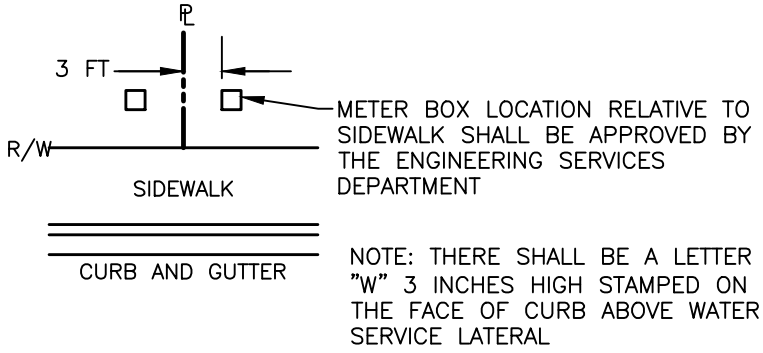
SPECIAL PROVISIONS GENERAL NOTES

1. NO PIPE JOINTS SHALL BE PERMITTED WITHIN ZONES C AND D.
2. ALL DIP MUST HAVE HOT DIP BITUMINOUS COATING AND ALL CLASS 200 PVC MUST MEET DR-14 PER AWWA C900 OR EQUIVALENT.
3. SEWER FORCE MAINS SHALL NOT BE PERMITTED IN ZONES A THROUGH D.
4. THIS CRITERIA DOES NOT APPLY FOR A RECLAIMED WATER LINE CROSSING ANOTHER RECLAIMED WATER LINE.
5. THE CONSTRUCTION CRITERIA SHOULD APPLY TO THE HOUSE LATERALS THAT CROSS ABOVE A PRESSURE WATER MAIN BUT NOT TO THOSE HOUSE LATERALS THAT CROSS BELOW A PRESSURE WATER MAIN.
6. CONSTRUCTION FOR SEWER AND DOMESTIC WATER OR RECLAIMED WATER LINES 24 INCH DIAMETER OR LARGER WILL NOT BE ALLOWED WITHOUT THE APPROVAL OF THE CITY ENGINEER AND THE STATE HEALTH DEPARTMENT.
7. SEE STANDARD DETAIL W-1A FOR APPLICABLE SITUATIONS.

GENERAL NOTES WET UTILITIES SEPARATION

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W-1B COUNCIL APPROVAL DATE DATE 03/26/2018





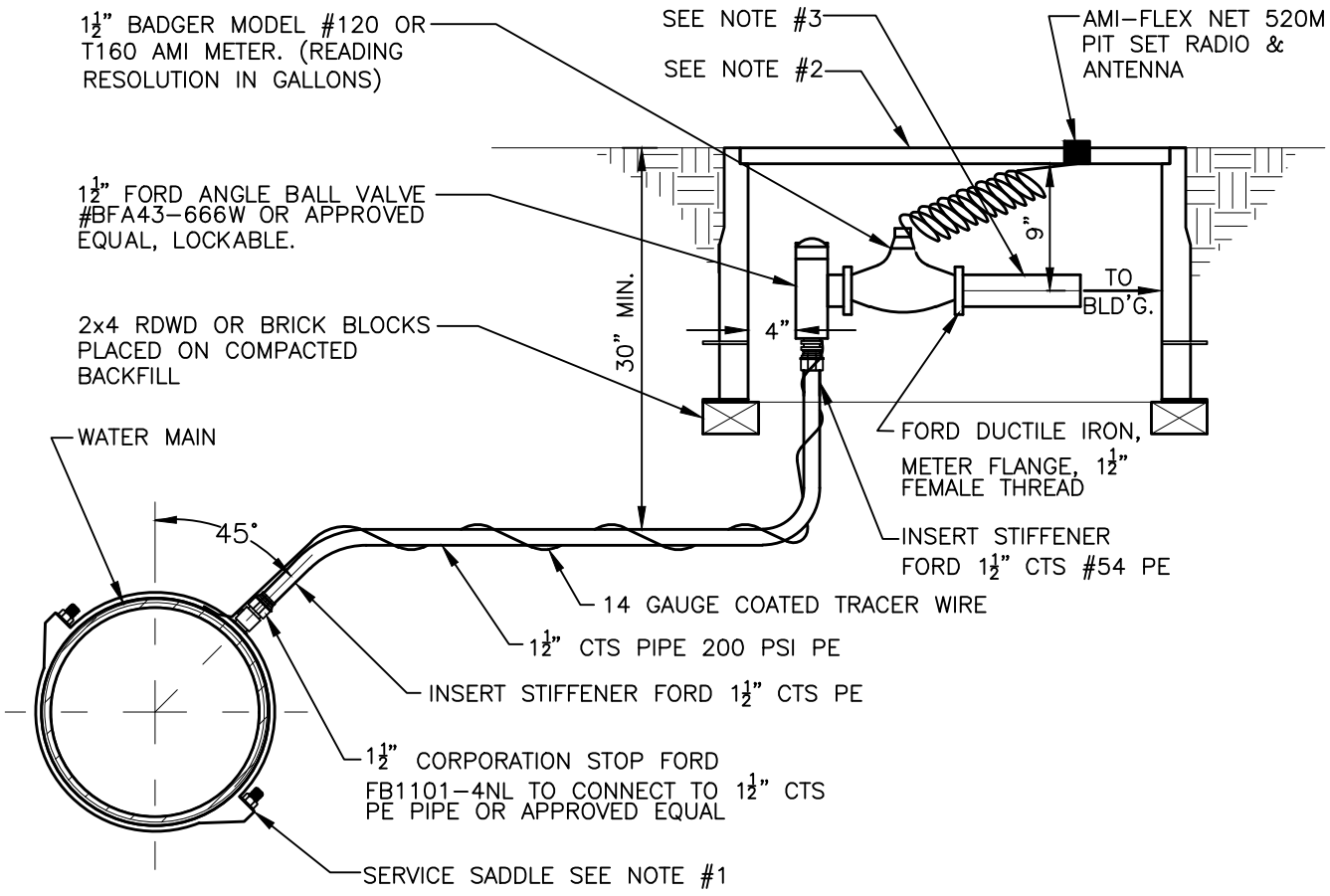
METER BOX LOCATION

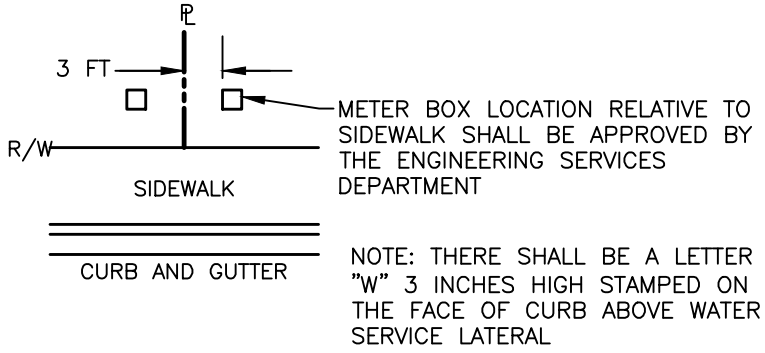
GENERAL NOTES

1. PVC PIPE, DUCTILE IRON PIPE AND ASBESTOS-CEMENT PIPE SADDLE SHALL BE ROMAC 202S OR FORD FS 202, WITH STAINLESS STEEL DOUBLE BANDS OR APPROVED EQUAL.
2. FIBERLYTE FL30-12 METER BOX WITH FL30P LID, AND AMI SENSUS 520M RADIO & ANTENNA.
3. 12" LONG BRASS NIPPLE. PROPERTY OWNER SHALL BE RESPONSIBLE TO EXTEND WATER SERVICE FROM THIS POINT ON TO THE BUILDING.

NEW WATER SERVICE CONNECTION 1 INCH

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W-2A COUNCIL APPROVAL DATE DATE 03/26/2018





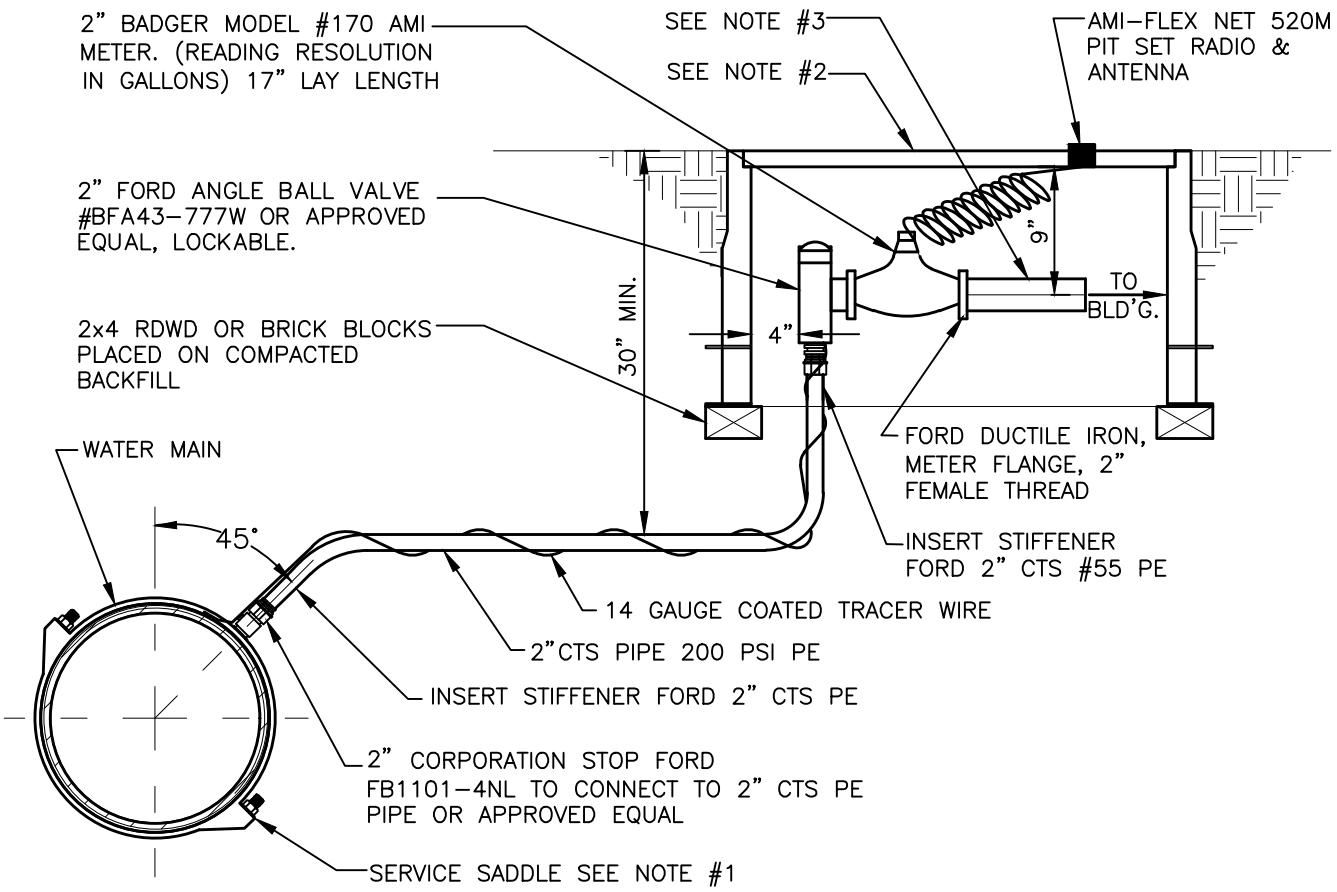
METER BOX LOCATION

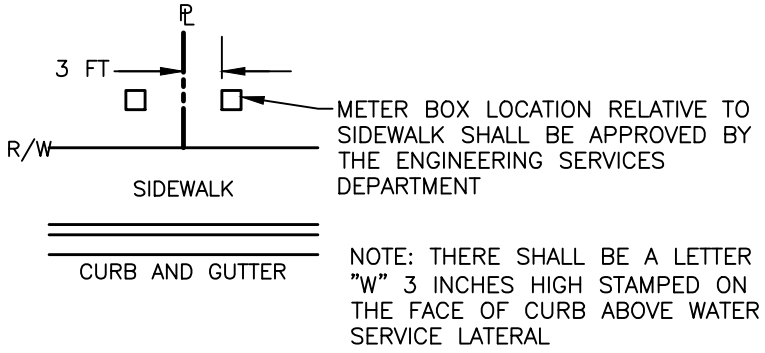
GENERAL NOTES

1. PVC PIPE, DUCTILE IRON PIPE AND ASBESTOS–CEMENT PIPE SADDLE SHALL BE ROMAC 202S OR FORD FS 202S, WITH STAINLESS STEEL DOUBLE BANDS OR APPROVED EQUAL.
2. FIBERLYTE FL36–12 METER BOX WITH FL36P LID, AND AMI SENSUS 520M RADIO & ANTENNA.
3. 12" LONG BRASS NIPPLE. PROPERTY OWNER SHALL BE RESPONSIBLE TO EXTEND WATER SERVICE FROM THIS POINT ON TO THE BUILDING.
4. COMMERCIAL METERS SHALL BE SUPPLIED BY OWNER/CONTRACTOR.

NEW WATER SERVICE CONNECTION 1–1/2 INCH

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W–2B COUNCIL APPROVAL DATE DATE 03/26/2018





METER BOX LOCATION

GENERAL NOTES

1. PVC PIPE, DUCTILE IRON PIPE AND ASBESTOS-CEMENT PIPE SADDLE SHALL BE ROMAC 202S OR FORD FS 202, WITH STAINLESS STEEL DOUBLE BANDS OR APPROVED EQUAL.
2. FIBERLYTE FL36-12 METER BOX WITH FL36P LID, AND AMI SENSUS 520M RADIO & ANTENNA.
3. 12" LONG BRASS NIPPLE. PROPERTY OWNER SHALL BE RESPONSIBLE TO EXTEND WATER SERVICE FROM THIS POINT ON TO THE BUILDING.
4. COMMERCIAL METERS SHALL BE SUPPLIED BY OWNER/CONTRACTOR.

NEW WATER SERVICE CONNECTION 2 INCH

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W-2C COUNCIL APPROVAL DATE DATE 03/26/2018

NEW WATER SERVICE CONNECTION 3 INCH & LARGER

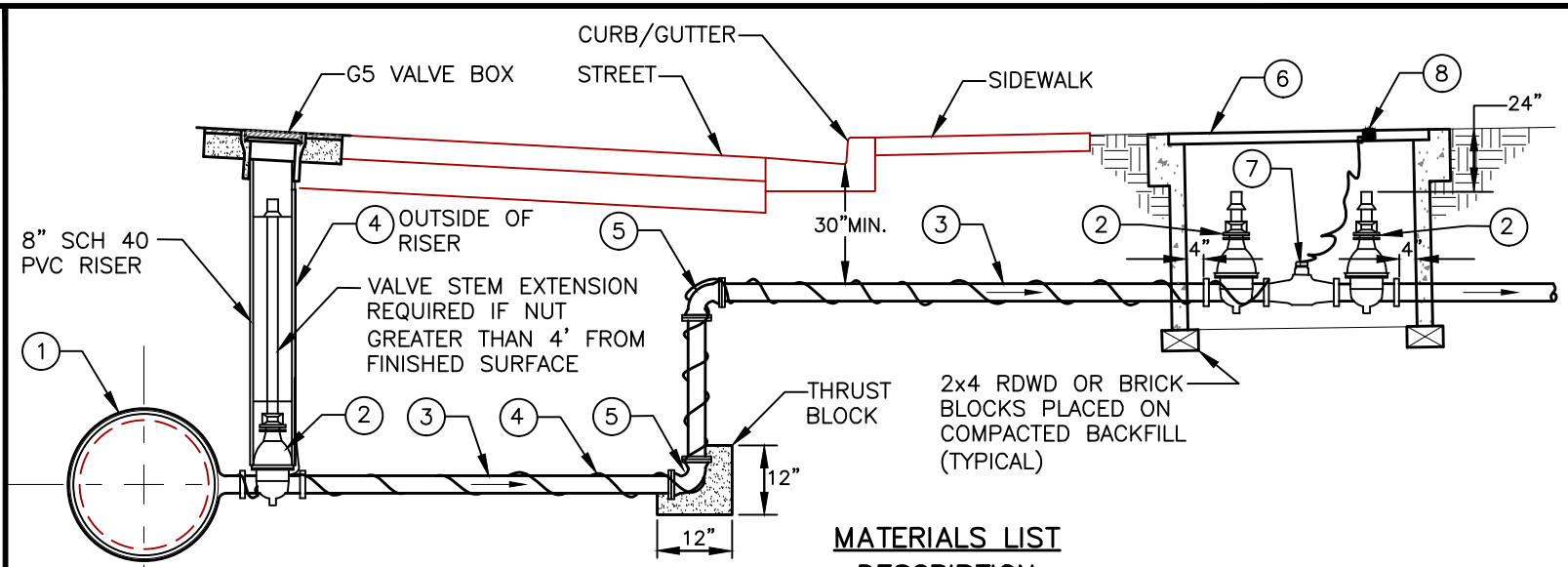
CITY OF CERES
ENGINEERING DEPARTMENT

PREPARED BY: SER
CHECKED BY: DRJ
SCALE: NONE

APPROVED BY
CITY ENGINEER – DARYL JORDAN – RCE 58036

PLATE NO: W-2D

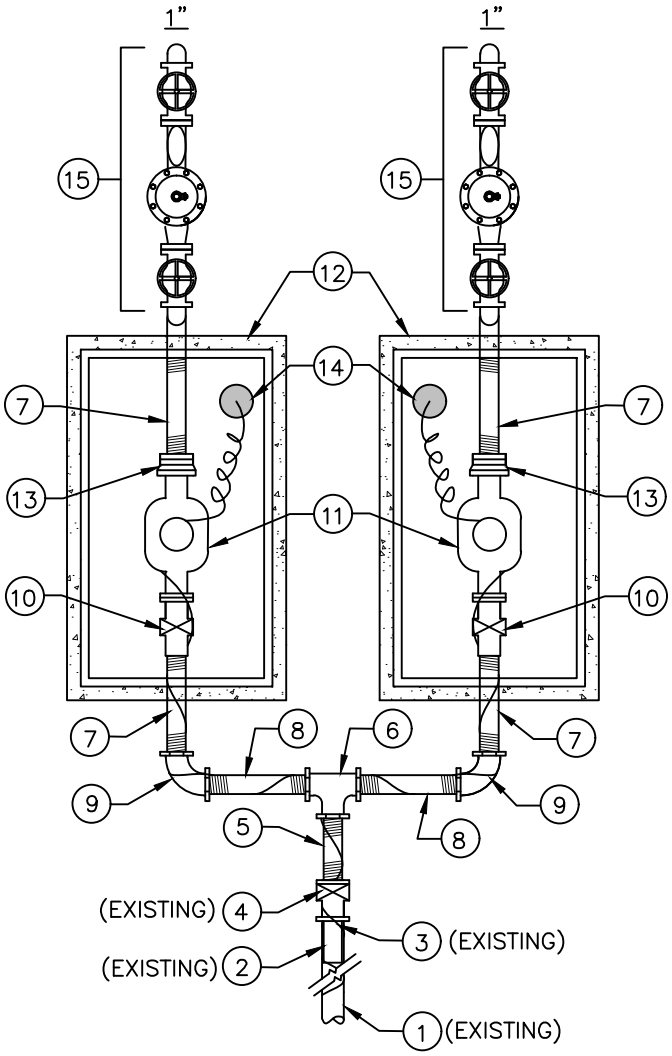
COUNCIL APPROVAL DATE
DATE 03/26/2018



MATERIALS LIST
DESCRIPTION

ITEM	
1	TAPPING SLEEVE ROMAC STAINLESS STEEL (SST W/ .5" PLUG ON OUTLET SIDE)
2	GATE VALVE – FLANGE x MJ (CLOW OR AFC, CAST IRON, EPOXY COATED, AWWA APPROVED)
3	4" & LARGER USE PVC C900 DR–18, 3" USE SCH. 40 OR SCH. 80 PVC.
4	PLASTIC COATED 12 GAUGE THHN COPPER TRACER WIRE FOR FUTURE DETECTION. FULL LENGTH OF PE PIPE.
5	90° BEND MJxMJ WITH GRIP RING ACCESSORY KIT.
6	FOR 3" SERVICE USE OLD CASTLE B48 CONCRETE METER BOX WITH 10" RISER AS NEEDED. LID – 2 PIECE B48P W/ 1.75" HOLE IN LID FOR AMI ANTENNA. FOR SERVICES LARGER THAN 3" USE BIGGER OLD CASTLE CONCRETE METER BOXES.
7	3" COMPOUND OR T450 TURBO WITH STRAINER, 4" COMPOUND OR T1000 TURBO WITH STRAINER, 6" COMPOUND OR T2000 WITH STRAINER, 8" COMPOUND OR T3500 TURBO WITH STRAINER. ALL METERS SHALL BE SUPPLIED NY OWNER/CONTRACTOR.
8	AMI – FLEX NET 520M PIT SET RADIO AND ANTENNA.

NOTES:
COMPOUND METERS ARE FOR DOMESTIC OR DOMESTIC/ IRRIGATION COMBINED AND TURBOS ARE FOR IRRIGATION ONLY.
HOT TAP REQUIREMENTS:
1. LICENSING: MUST BE LICENSED AS A CONTRACTOR FOR THIS TYPE OF WORK.
2. BACKGROUND: HOW MANY TAPS HAVE THEY PERFORMED AND WHERE – PROVIDE REFERENCES
3. PROVIDE WRITTEN INSTALLATION PROCEDURES OF TAPPING SLEEVE FOR APPROVAL
4. PROVIDE WRITTEN PRESSURE TESTING PROCEDURES FOR APPROVAL
5. PROVIDE WRITTEN DISINFECTION PROCEDURE FOR APPROVAL
6. 48 HOUR NOTICE IS REQUIRED PRIOR TO THIS WORK BEING PERFORMED.
   REFERENCES AND PROCEDURE APPROVAL REQUIRED PRIOR TO 48 HOUR NOTICE.

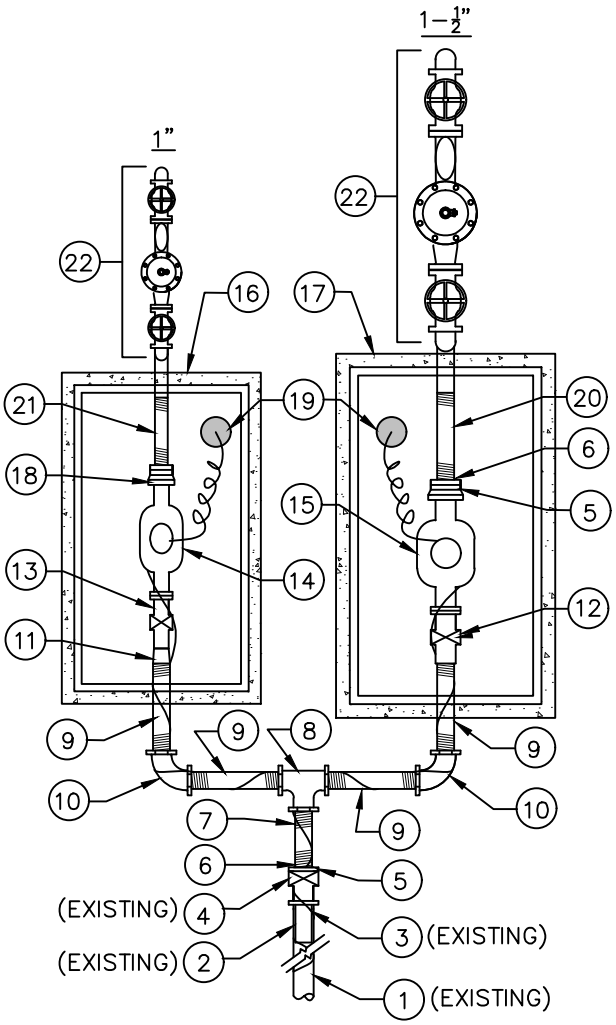


MATERIALS LIST
DESCRIPTION

ITEM	
1	1" PIPE IPS 200 PSI PE (EXISTING).
2	INSERT STIFFENER FORD "INSERT 53–72" 1" INSERT (EXISTING).
3	PLASTIC COATED 14 GAUGE THHN COPPER TRACER WIRE (EXISTING).
4	1" FORD ANGLE BALL VALVE #BA63–444W (EXISTING).
5	3" LONG BRASS NIPPLE
6	1"x 1"X 1" BRASS TEE (THREADED)
7	12" LONG BRASS NIPPLE
8	18" LONG BRASS NIPPLE
9	1"x 1" 90° BRASS BEND (THREADED)
10	B13–444W FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE OR APPROVED EQUAL
11	1" BADGER MODEL M 55 METER, WITH 5' CABLE WITH TOUCH COUPLER FOR SENSUS AMI SYSTEM. (READING RESOLUTION IN GALLONS)
12	FIBERLYTE FL30 BOX–12 METER BOX & LID WITH 1–¾" HOLE IN LID FOR AMI ANTENNA
13	FORD STRAIGHT METER COUPLING C31–44
14	AMI – FLEX NET 520M PIT SET RADIO AND ANTENNA. ONE PER METER
15	WILKINS MODEL 975XL2 OR FEBCO LF825Y RP ASSEMBLY. BACKFLOW ENCLOSURE NOT REQUIRED BUT RECOMMENDED.

1 INCH WATER SERVICE LINE BULLHEAD

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W–3A COUNCIL APPROVAL DATE DATE 03/26/2018



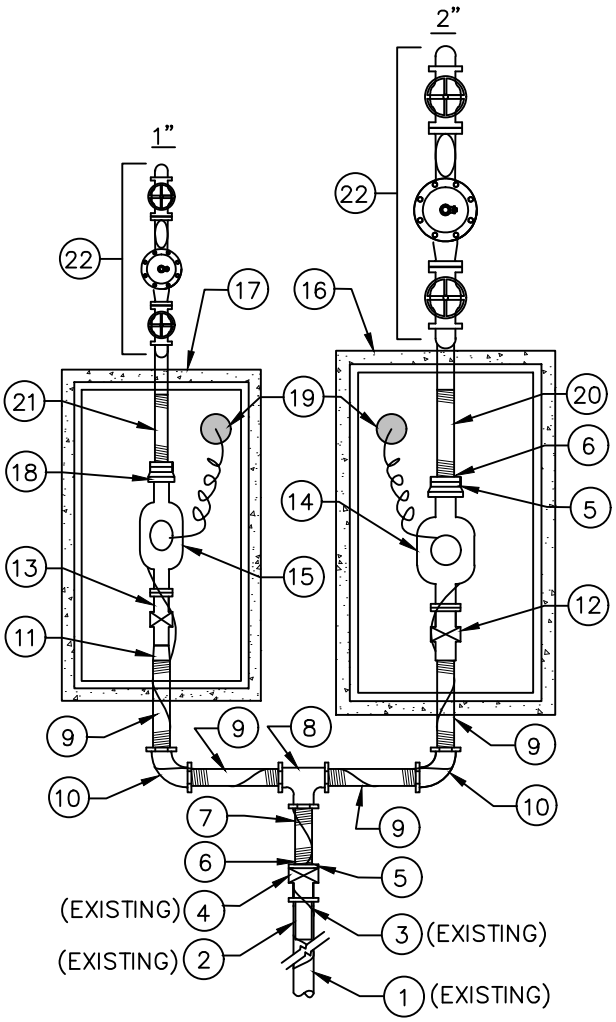
NOTE: MODEL # 120 METERS ARE FOR DOMESTIC WATER OR DOMESTIC & IRRIGATION COMBINED AND T160 METERS ARE FOR IRRIGATION USE ONLY.
MAINTAIN 9" CLEARANCE FROM TOP OF METER TO BOTTOM OF LID WHEN SET TO FINISHED LANDSCAPE GRADE WITHIN 3' OF BACK OF WALK.

MATERIALS LIST

ITEM	DESCRIPTION
1	1-½" PIPE CTS 200 PSI PE (EXISTING).
2	INSERT STIFFENER FORD "INSERT 53-72" 1" INSERT (EXISTING).
3	PLASTIC COATED 14 GAUGE THHN COPPER TRACER WIRE (EXISTING) .
4	1-½" FORD ANGLE BALL VALVE CURB STOP #BFA43-666W (EXISTING).
5	1-½" FORD METER GASKET
6	1-½" METER FLANGE X FEMALE IRON PIPE ADAPTER (DUCTILE IRON)
7	3" LONG BRASS NIPPLE
8	1-½" x 1-½" X 1-½" BRASS TEE (THREADED)
9	1-½" X 12" LONG BRASS NIPPLE
10	1-½" x 2" 90° BRASS BEND (THREADED)
11	1-½" x 1" BRASS REDUCER
12	1-½" FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE BF13-666W OR APPROVED EQUAL
13	(1") B13-444W FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE OR APPROVED EQUAL
14	1" BADGER MODEL 55 WITH TOUCH COUPLER FOR SENSUS RADIO. (READING RESOLUTION IN GALLONS)
15	1-½" BADGER MODEL # 120 OR T160 WITH TOUCH COUPLER FOR SENSUS RADIO. (READING RESOLUTION IN GALLONS) SEE NOTE BELOW
16	FIBERLYTE FL30 BOX-12 METER BOX & LID WITH 1-¾" HOLE IN LID FOR AMI ANTENNA
17	FIBERLYTE FL36 BOX-12 METER BOX & LID WITH 1-¾" HOLE IN LID FOR AMI ANTENNA
18	(1") FORD STRAIGHT METER COUPLING C31-44
19	AMI - FLEX NET 520M PIT SET RADIO & ANTENNA. ONE PER METER.
20	1-½" X 24" BRASS NIPPLE
21	1" X 24" BRASS NIPPLE
22	WILKINS MODEL 975XL2 OR FEBCO LF825Y RP ASSEMBLY. BACKFLOW ENCLOSURE NOT REQUIRED BUT RECOMMENDED.

1-1/2 INCH WATER SERVICE LINE BULLHEAD

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W-3B COUNCIL APPROVAL DATE DATE 03/26/2018



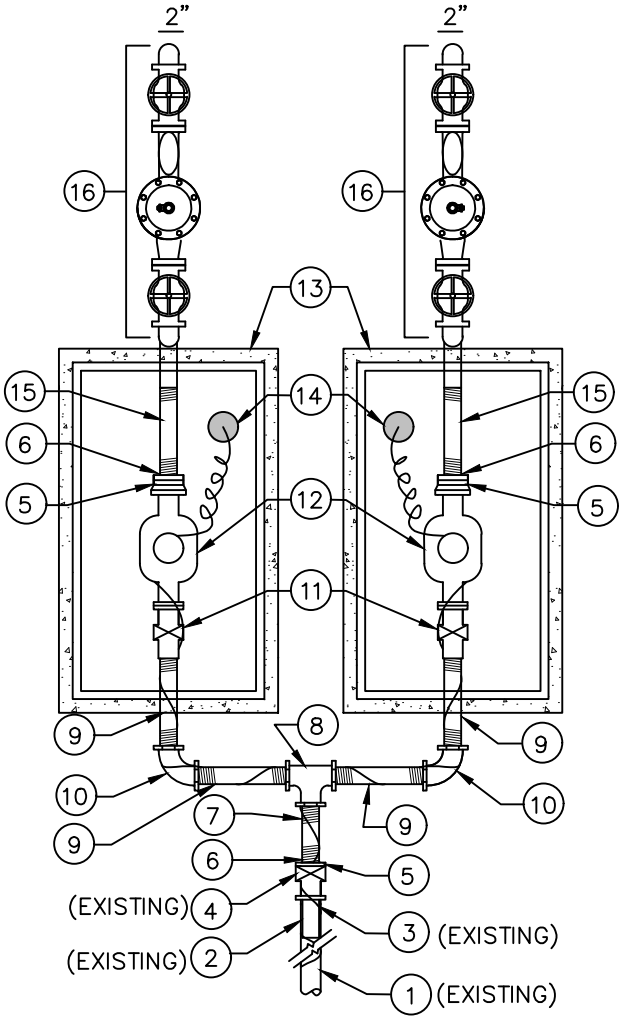
NOTE: MODEL # 170 METERS ARE FOR DOMESTIC WATER OR DOMESTIC & IRRIGATION COMBINED AND T160 METERS ARE FOR IRRIGATION USE ONLY.
MAINTAIN 9" CLEARANCE FROM TOP OF METER TO BOTTOM OF LID WHEN SET TO FINISHED LANDSCAPE GRADE WITHIN 3' OF BACK OF WALK.

MATERIALS LIST

ITEM	DESCRIPTION
1	2" PIPE CTS 200 PSI PE (EXISTING).
2	INSERT STIFFENER (EXISTING)
3	PLASTIC COATED 14 GAUGE THHN COPPER TRACER WIRE (EXISTING).
4	2" FORD ANGLE BALL VALVE CURB STOP #BFA43-777W-NL (EXISTING).
5	2" METER GASKET
6	2" METER FLANGE X FEMALE IRON PIPE ADAPTER (DUCTILE IRON)
7	3" LONG BRASS NIPPLE
8	2"x 2"X 2" BRASS TEE (THREADED)
9	2" X 12" LONG BRASS NIPPLE
10	2"x 2" 90° BRASS BEND (THREADED)
11	2" x 1" BRASS REDUCER
12	2" FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE BF13-777W OR APPROVED EQUAL
13	(1") B13-444W FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE OR APPROVED EQUAL
14	2" BADGER MDL170 AMI METER WITH TOUCH COUPLER FOR SENSUS RADIO. (READING RESOLUTION IN GALLONS)
15	1" BADGER MDL55 AMI METER WITH TOUCH COUPLER FOR SENSUS RADIO. (READING RESOLUTION IN GALLONS)
16	FIBERLYTE FL36 BOX-12 METER BOX & LID WITH 1-¾" HOLE IN LID FOR AMI ANTENNA
17	FIBERLYTE FL30 BOX-12 METER BOX & LID W/ 1-¾" HOLE IN LID FOR AMI ANTENNA
18	(1") FORD STRAIGHT METER COUPLING C31-44
19	AMI - FLEX NET 520M PIT SET RADIO & ANTENNA. ONE PER METER
20	2" X 24" BRASS NIPPLE
21	1" X 24" BRASS NIPPLE
22	WILKINS MODEL 975XL2 OR FEBCO LF825Y RP ASSEMBLY. BACKFLOW ENCLOSURE NOT REQUIRED BUT RECOMMENDED.

2 INCH WATER SERVICE LINE BULLHEAD FOR 1" & 2"

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: W-3C
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



MATERIALS LIST
DESCRIPTION

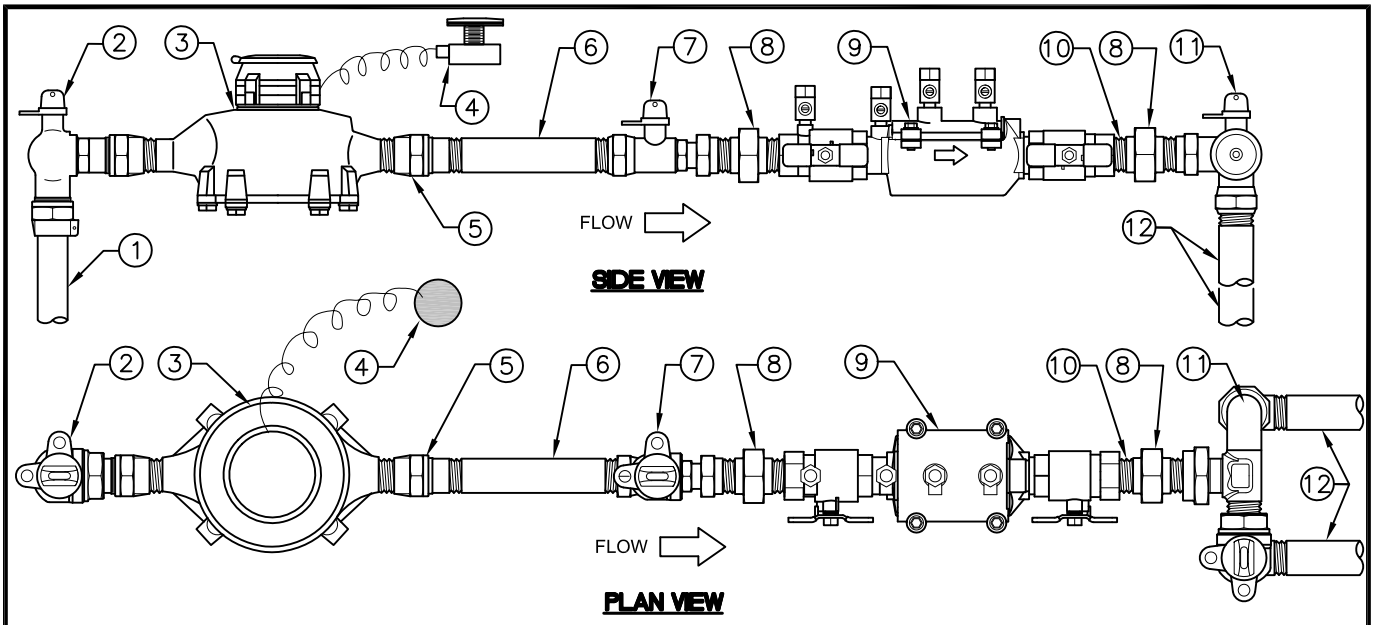
ITEM	
1	2" PIPE CTS 200 PSI PE (EXISTING).
2	INSERT STIFFENER (EXISTING).
3	PLASTIC COATED 14 GAUGE THHN COPPER TRACER WIRE (EXISTING).
4	2" FORD ANGLE BALL VALVE CURB STOP #BFA43-777W-NL (EXISTING).
5	2" METER GASKET
6	2" METER FLANGE X FEMALE IRON PIPE ADAPTER (DUCTILE IRON)
7	3" LONG BRASS NIPPLE
8	2"x 2"X 2" BRASS TEE (THREADED)
9	2" X 12" LONG BRASS NIPPLE
10	2"x 2" 90° BRASS BEND (THREADED)
11	2" FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE BF13-777W OR APPROVED EQUAL
12	2" BADGER MDL170 AMI METER WITH TOUCH COUPLER FOR SENSES RADIO. (READING RESOLUTION IN GALLONS)
13	FIBERLYTE FL36 METER BOX & LID WITH 1-¾" HOLE IN LID FOR AMI ANTENNA
14	AMI - FLEX NET 520M PIT SET RADIO AND ANTENNA. ONE PER METER
15	2" X 24" BRASS NIPPLE
16	WILKINS MODEL 975XL2 OR FEBCO LF825Y RP ASSEMBLY. BACKFLOW ENCLOSURE IS NOT REQUIRED BUT RECOMMENDED.

NOTES:
MODEL # 170 METERS ARE FOR DOMESTIC WATER OR DOMESTIC & IRRIGATION COMBINED AND T160 METERS ARE FOR IRRIGATION USE ONLY.

HOT TAP REQUIREMENTS:
1. LICENSING: MUST BE LICENSED AS A CONTRACTOR FOR THIS TYPE OF WORK.
2. BACKGROUND: HOW MANY TAPS HAVE THEY PERFORMED AND WHERE - PROVIDE REFERENCES
3. PROVIDE WRITTEN INSTALLATION PROCEDURES OF TAPPING SLEEVE FOR APPROVAL
4. PROVIDE WRITTEN PRESSURE TESTING PROCEDURES FOR APPROVAL
5. PROVIDE WRITTEN DISINFECTION PROCEDURE FOR APPROVAL
6. THE WATER DEPARTMENT WILL NEED 48 HOUR NOTICE PRIOR TO THIS WORK BEING PERFORMED. REFERENCES AND PROCEDURE APPROVAL REQUIRED PRIOR TO 48 HOUR NOTICE.

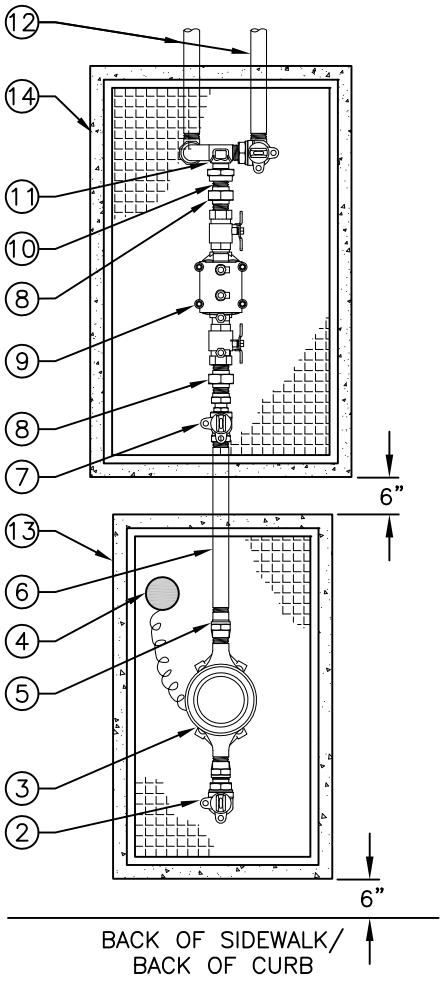
2 INCH WATER SERVICE LINE BULLHEAD

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER - DARYL JORDAN - RCE 58036	PLATE NO: W-3D COUNCIL APPROVAL DATE DATE 03/26/2018



SIDE VIEW

PLAN VIEW

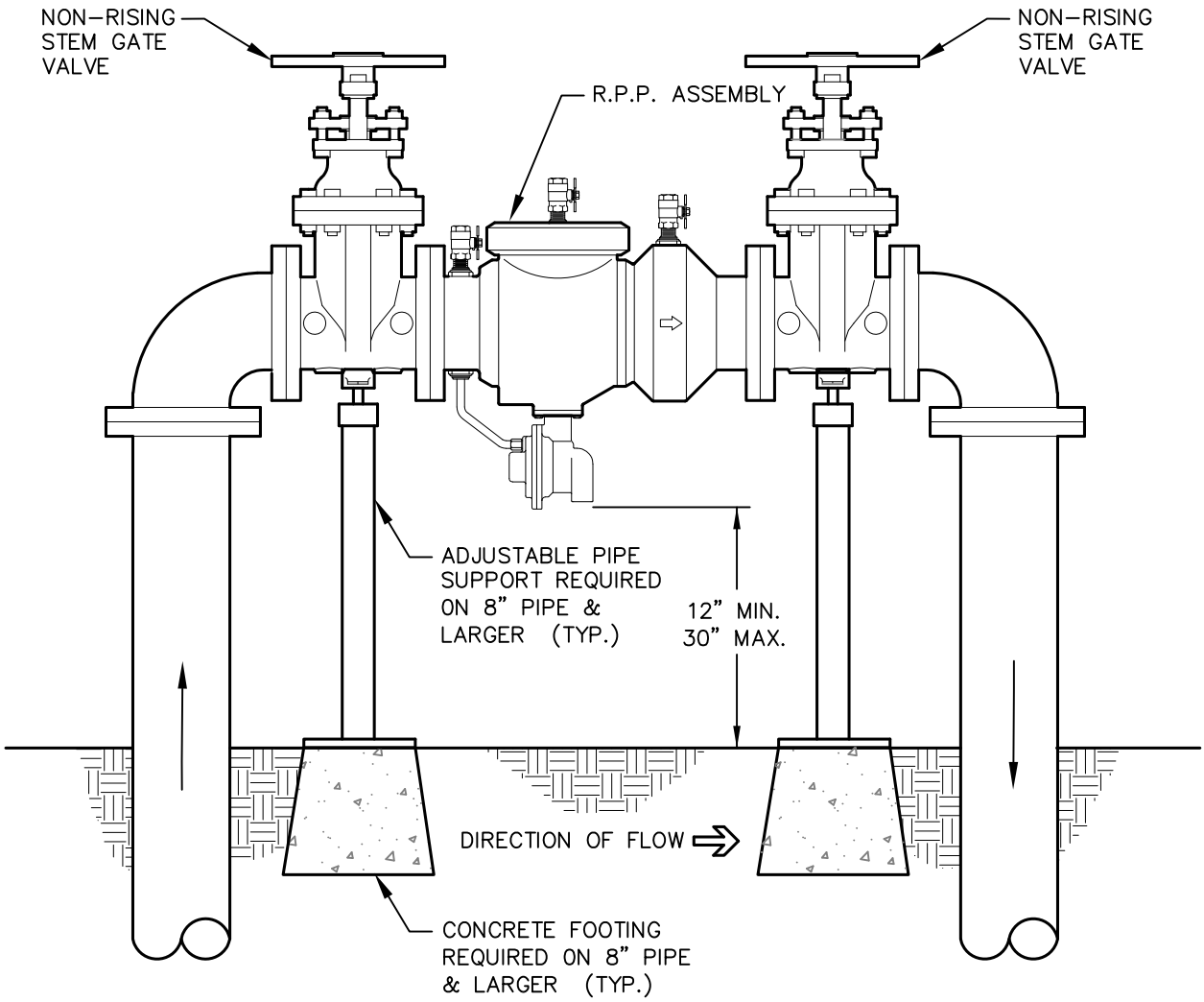


MATERIALS LIST
DESCRIPTION

ITEM	
1	1" PIPE IPS 200 PSI PE SUPPLY LINE FROM WATER MAIN.
2	BA63-444WNL FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE OR APPROVED EQUAL.
3	BADGER METER-MODEL 55, 1" RECORDALL COLD WATER BRONZE DISC METER.
4	AMI-FLEX NET 520M PIT SET RADIO AND ANTENNA. ONE PER METER.
5	FORD METER COUPLING-MODEL C31-44
6	18" LONG BRASS NIPPLE.
7	B13-444WNL FORD STRAIGHT CURB STOP VALVE W/ LOCKABLE HANDLE OR APPROVED EQUAL.
8	1" BRASS UNION.
9	WILKINS-DOUBLE CHECK VALVE ASSEMBLY MODEL 950XLT2 OR 350XLT2
10	1" THREADED BRASS NIPPLE
11	FORD ELL TEE FOR FIRESETTER, 1"IN X 1" OUTLET-MODEL LTBA 113-444W-AWT-NL, OR APPROVED EQUAL.
12	(2)1"x12" LONG BRASS NIPPLE-WATER SERVICE AND FIRE SERVICE. PROPERTY OWNER TO EXTEND WITH 1" SCH. 40 PVC TO RESIDENCE.
13	FIBERLYTE FL30 BOX METER BOX & LID WITH 2" HOLE IN LID FOR AMI ANTENNA.
14	FIBERLYTE FL36 METER BOX & LID.

1 INCH WATER & FIRE SERVICE - RESIDENTIAL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: W-3E
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER - DARYL JORDAN - RCE 58036		DATE 03/26/2018

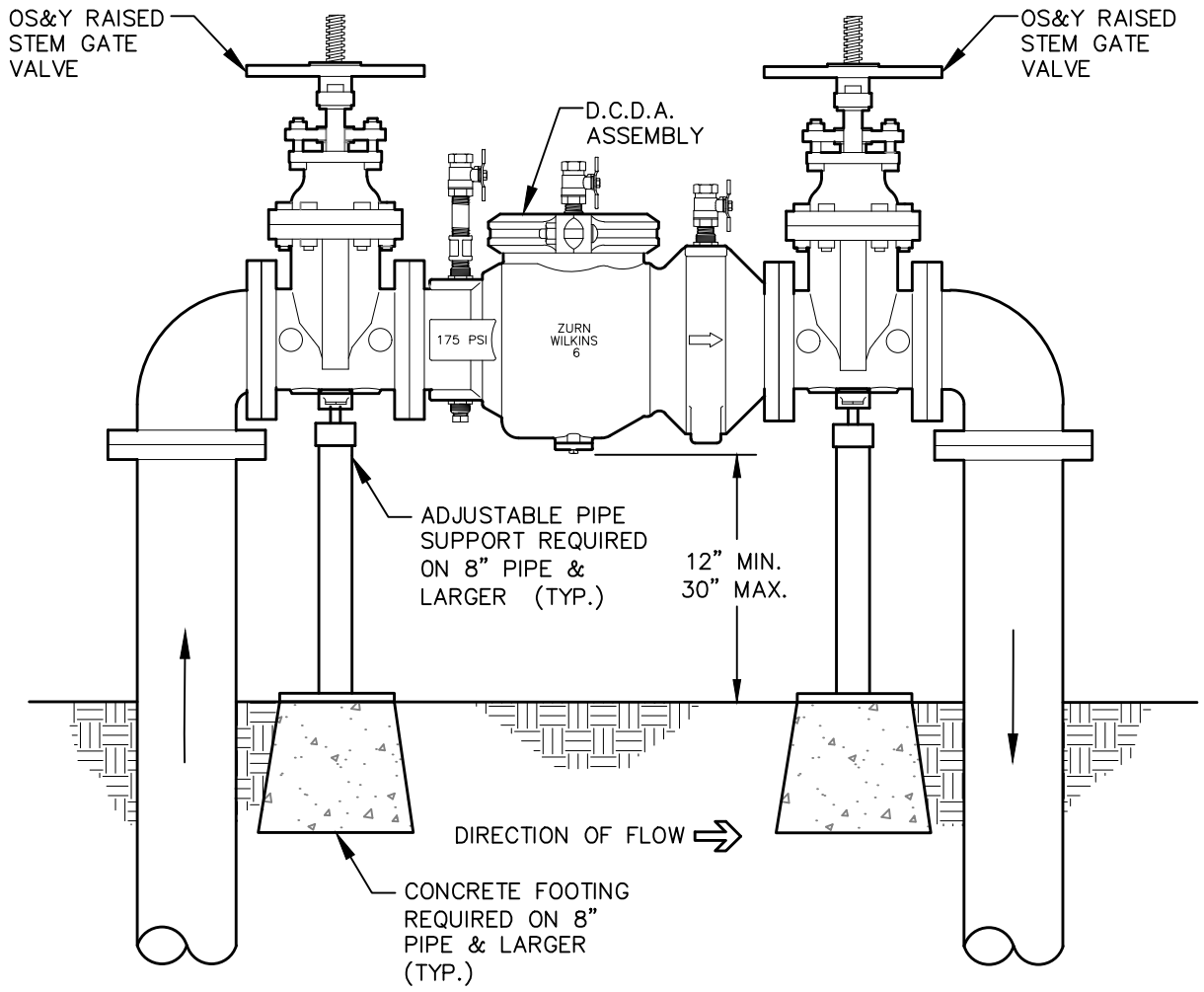


NOTES

- ALL SERVICE CONNECTIONS THAT ARE NOT FOR A SINGLE FAMILY RESIDENCE ARE REQUIRED TO HAVE BACKFLOW PROTECTION.
- BACKFLOW ASSEMBLIES MUST BE TESTED BY A CERTIFIED TESTER THAT IS RECOGNIZED BY THE CITY OF CERES.
- FINISHED GRADE UNDERNEATH THE BACKFLOW PREVENTER SHALL BE AT 95% COMPACTION.
- ADJUSTABLE PIPE SUPPORT AND CONCRETE FOOTING SHALL BE INSTALLED ON 8" PIPE AND LARGER.
- CALL CITY OF CERES ENGINEERING DIVISION FOR UNDERGROUND INSPECTION BEFORE BACKFILLING TRENCH.
- APPROVALS FOR BACKFLOW ASSEMBLIES MUST HAVE SEAL APPROVAL FROM THE AMERICAN SOCIETY OF SANITATION ENGINEERS. BACKFLOW ASSEMBLIES INSTALLED ON FIRE SUPRESSION SYSTEMS MUST ALSO HAVE APPROVAL FROM UNDERWRITERS LABORATORIES AND/OR FACTORY MUTUAL RESEARCH CORPORATION.
- PIPE SHALL BE DUCTILE IRON.
- REDUCED PRESSURE PRINCIPLE ASSEMBLY AS APPROVED BY USC WITH NON–RISING STEM GATE VALVES.

REDUCED PRESSURE PRINCIPLE ASSEMBLY 3" AND LARGER

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: W–4A
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



NOTES

- ALL SERVICE CONNECTIONS THAT ARE NOT FOR A SINGLE FAMILY RESIDENCE ARE REQUIRED TO HAVE BACKFLOW PROTECTION.
- BACKFLOW ASSEMBLIES MUST BE TESTED BY A CERTIFIED TESTER THAT IS RECOGNIZED BY THE CITY OF CERES.
- FINISHED GRADE UNDERNEATH THE BACKFLOW PREVENTER SHALL BE AT 95% COMPACTION.
- CALL CITY OF CERES ENGINEERING DIVISION FOR UNDERGROUND INSPECTION BEFORE BACKFILLING TRENCH.
- APPROVALS FOR BACKFLOW ASSEMBLIES MUST HAVE SEAL APPROVAL FROM THE AMERICAN SOCIETY OF SANITATION ENGINEERS. BACKFLOW ASSEMBLIES INSTALLED ON FIRE SUPRESSION SYSTEMS MUST ALSO HAVE APPROVAL FROMUNDERWRITERS LABORATORIES AND/OR FACTORY MUTUAL RESEARCH CORPORATION.
- PIPE SHALL BE DUCTILE IRON.
- DOUBLE CHECK DETECTOR ASSEMBLY (DCDA) AS APPROVED BY USC WITH OS&Y (OUTSIDE STEM AND YOKE) GATE VALVES.

DOUBLE CHECK DETECTOR ASSEMBLY 3" AND LARGER

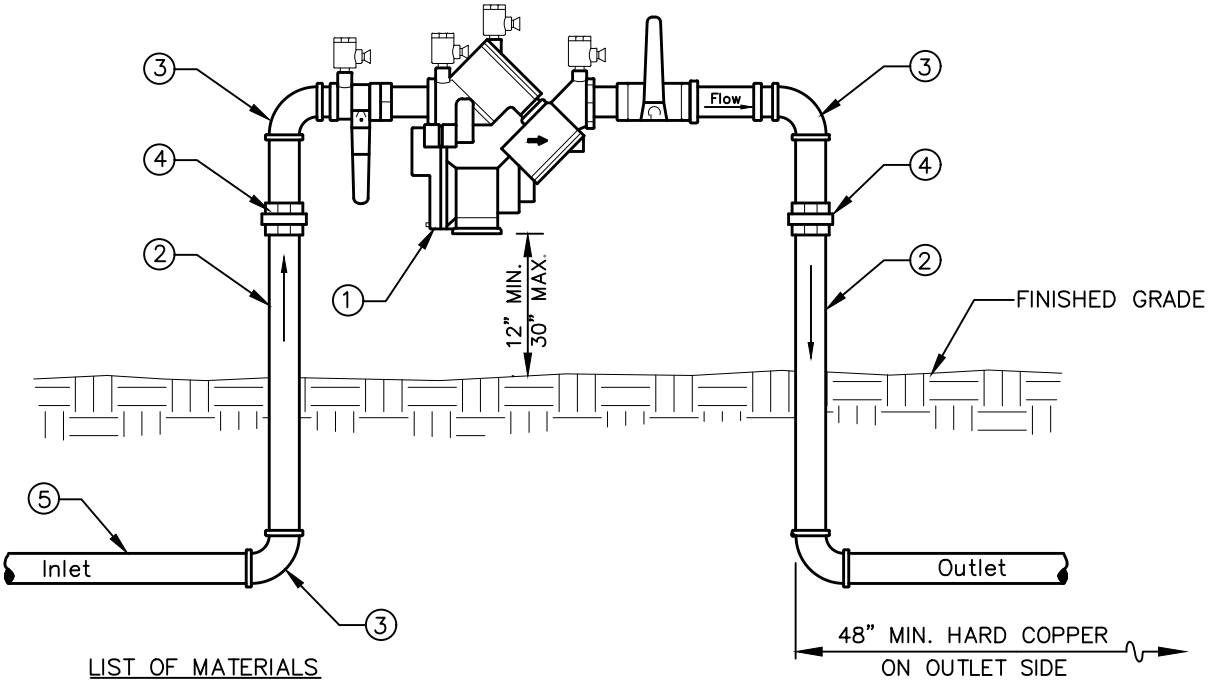
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: W-4B
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

NOTES

- ALL SERVICE CONNECTIONS THAT ARE NOT FOR A SINGLE FAMILY RESIDENCE ARE REQUIRED TO HAVE BACKFLOW PROTECTION.
- BACKFLOW ASSEMBLIES MUST BE TESTED BY A CERTIFIED TESTER THAT IS RECOGNIZED BY THE CITY OF CERES.
- FINISHED GRADE UNDERNEATH THE BACKFLOW PREVENTER SHALL BE AT 95% COMPACTION.
- ADJUSTABLE PIPE SUPPORT AND CONCRETE FOOTING SHALL BE REQUIRED ON 8" PIPE AND LARGER.
- CALL CITY OF CERES ENGINEERING DIVISION FOR UNDERGROUND INSPECTION BEFORE BACKFILLING TRENCH.
- APPROVALS FOR BACKFLOW ASSEMBLIES MUST HAVE SEAL APPROVAL FROM THE AMERICAN SOCIETY OF SANITATION ENGINEERS. BACKFLOW ASSEMBLIES INSTALLED ON FIRE SUPRESSION SYSTEMS MUST ALSO HAVE APPROVAL FROMUNDERWRITERS LABORATORIES AND/OR FACTORY MUTUAL RESEARCH CORPORATION.
- PIPE SHALL BE DUCTILE IRON.
- DOUBLE CHECK VALVE ASSEMBLY AS APPROVED BY USC WITH OS&Y (OPEN STEM AND YOKE) GATE VALVES.
- THIS CITY STANDARD IS DESIGNED FOR EXISTING FACILITIES THAT HAVE DOMESTIC AND IRRIGATION OR COMBINATION OF BOTH, WITH A LOW DEGREE OF HAZARDOUS TO BE DETERMINED BY THE CITY WATER DEPARTMENT.
- CITY WATER DEPARTMENT WILL DETERMINE THE WATER METER TO BE USED.

DOUBLE CHECK VALVE/METER ASSEMBLY 3" AND LARGER

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: W-4C COUNCIL APPROVAL DATE DATE 03/26/2018



LIST OF MATERIALS

(1) WILKINS MODEL 975XL2 OR FREBCO 825YLF REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (BPA), BALL VALVES INCLUDED.

(2) PIPE SPOOL TO FIT, GALVANIZED, BRASS OR COPPER

(3) 90° ELL, GALVANIZED, BRASS OR COPPER.

(4) TWO (2) PIPE UNIONS, GALVANIZED, BRASS OR COPPER.

(5) 18" NIPPLE, HARD PLUMED TO METER NUT OR METER FLANGE ON BACKSIDE OF METER, GALVANIZED, BRASS OR COPPER.

GENERAL NOTES

1. ALL SERVICE CONNECTIONS THAT ARE NOT FOR A SINGLE FAMILY RESIDENCE ARE REQUIRED TO HAVE BACKFLOW PROTECTION.
2. BACKFLOW ASSEMBLIES MUST BE TESTED BY A CERTIFIED TESTER THAT IS RECOGNIZED BY THE CITY OF CERES.
3. COPPER FITTINGS SHALL BE CONNECTED WITH LEAD FREE SOLDER JOINTS.
4. FINISHED GRADE UNDERNEATH THE BACKFLOW RE-ENTER SHALL BE AT 95% COMPACTION.
5. ALL FITTINGS TO BE GALVANIZED, BRASS OR COPPER.
6. CALL CITY OF CERES ENGINEERING DIVISION FOR UNDERGROUND INSPECTION BEFORE BACKFILLING TRENCH.
7. APPROVALS FOR BACKFLOW ASSEMBLIES MUST HAVE SEAL APPROVAL FROM THE AMERICAN SOCIETY OF SANITATION ENGINEERS. BACKFLOW ASSEMBLIES INSTALLED ON FIRE SUPRESSION SYSTEMS MUST ALSO HAVE APPROVAL FROM UNDERWRITERS LABORATORIES AND/OR FACTORY MUTUAL RESEARCH CORPORATION. BACKFLOW ASSEMBLY ENCLOSURE IS NOT REQUIRED BUT CAN BE INSTALLED PER PROPERTY OWNERS DISCRETION.

REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY 1"THROUGH 2"

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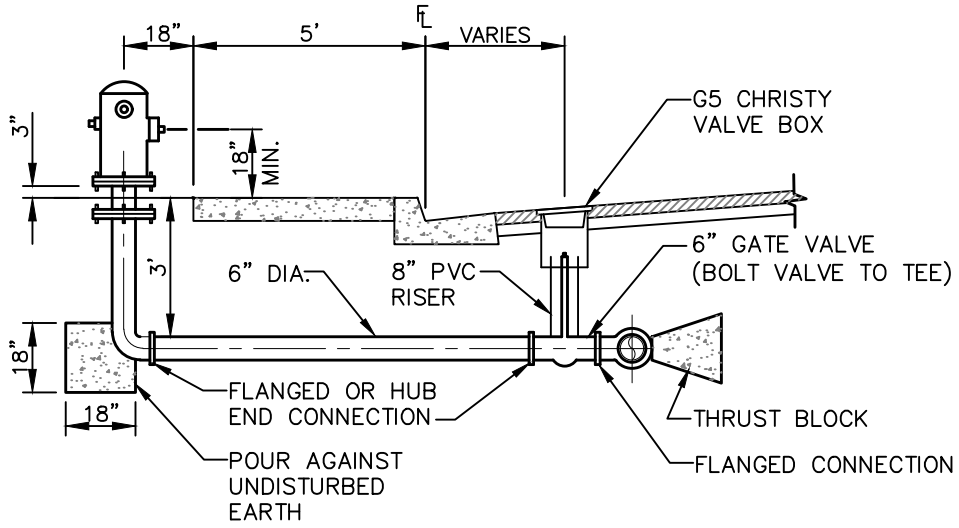
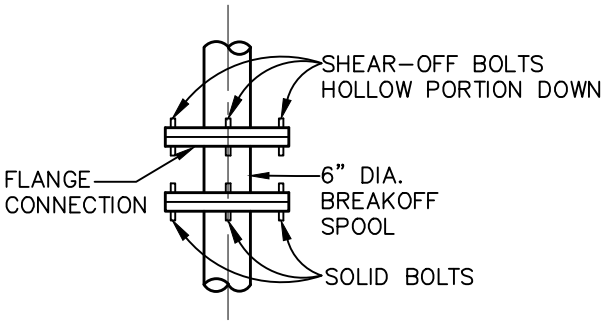
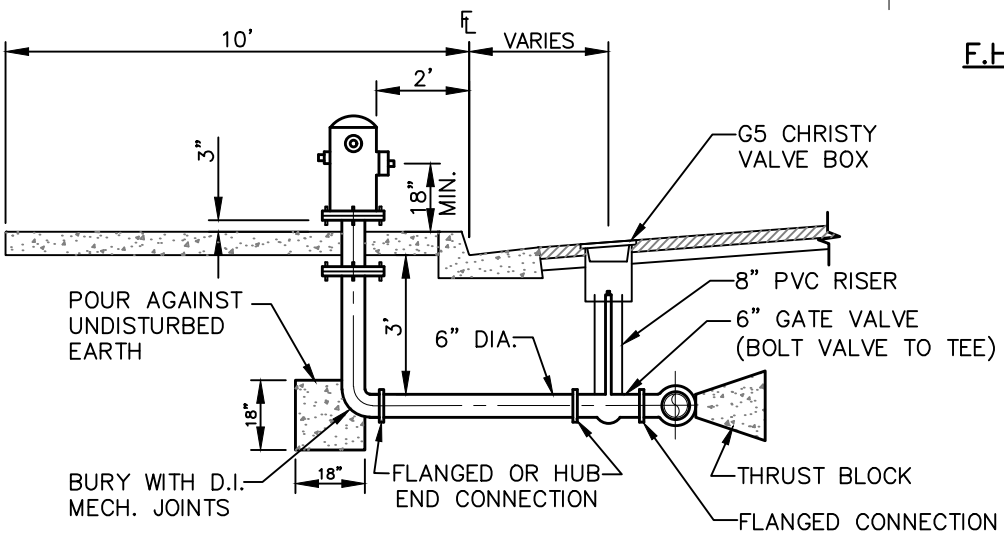


RESIDENTIAL



F.H. BASE

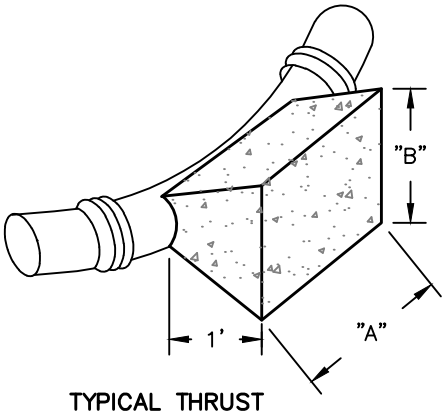


INDUSTRIAL/ COMMERCIAL

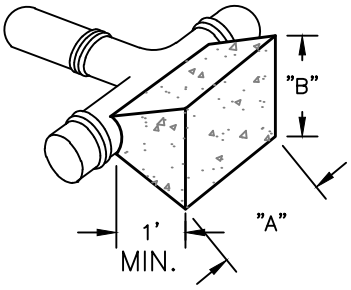
NOTES:
FIRE HYDRANTS: RICH CLOW SERIES #960 OR APPROVED EQUAL
VALVE BOX: SEE DETAIL SHEET #W–7
GATE VALVE: SEE DETAIL SHEET #W–7

FIRE HYDRANT ASSEMBLY

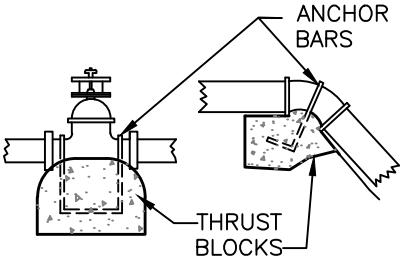
	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: W–5
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



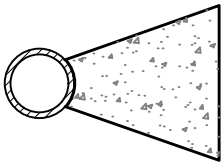
TYPICAL THRUST BLOCK CAST IRON BEND



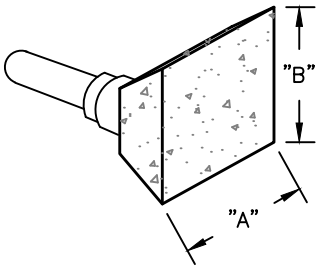
TYPICAL THRUST BLOCK TEE OUTLET



WHEN REQUIRED BY THE CITY ENGINEER



TYPICAL THRUST BLOCK CAST IRON BEND



TYPICAL THRUST BLOCK DEAD END

NOTES:

1. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED SOIL.
2. INSTALL A UNIFORM THRUST BLOCK IF SEPARATIONS BETWEEN BENDS IS LESS THAN 18".

THRUST BLOCK AREA REQUIRED		
FITTINGS	ALLOWABLE SOIL BEARINGS VALUE 1,000 LBS. PER EQ. FT.	
6" LINE	"A"	"B"
22 1/2° BEND	1'–6"	1'–6"
45° BEND	2'–0"	2'–0"
90° BEND	3'–0"	2'–6"
TEE OUTLET	3'–0"	2'–0"
DEAD END	3'–0"	2'–0"

THRUST BLOCK AREA REQUIRED		
FITTINGS	ALLOWABLE SOIL BEARINGS VALUE 1,000 LBS. PER EQ. FT.	
10" LINE	"A"	"B"
22 1/2° BEND	3'–0"	2'–0"
45° BEND	4'–0"	3'–0"
90° BEND	5'–6"	4'–0"
TEE OUTLET	4'–0"	4'–0"
DEAD END	4'–0"	4'–0"

8" LINE	"A"	"B"
22 1/2° BEND	2'–0"	2'–0"
45° BEND	3'–0"	2'–6"
90° BEND	4'–0"	3'–6"
TEE OUTLET	3'–6"	3'–0"
DEAD END	3'–6"	3'–0"

12" LINE	"A"	"B"
22 1/2° BEND	3'–0"	3'–0"
45° BEND	4'–6"	4'–0"
90° BEND	8'–0"	4'–0"
TEE OUTLET	5'–6"	4'–0"
DEAD END	5'–6"	4'–0"

THRUST BLOCK DETAILS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★

PREPARED BY: SER

CHECKED BY: DRJ

SCALE: NONE

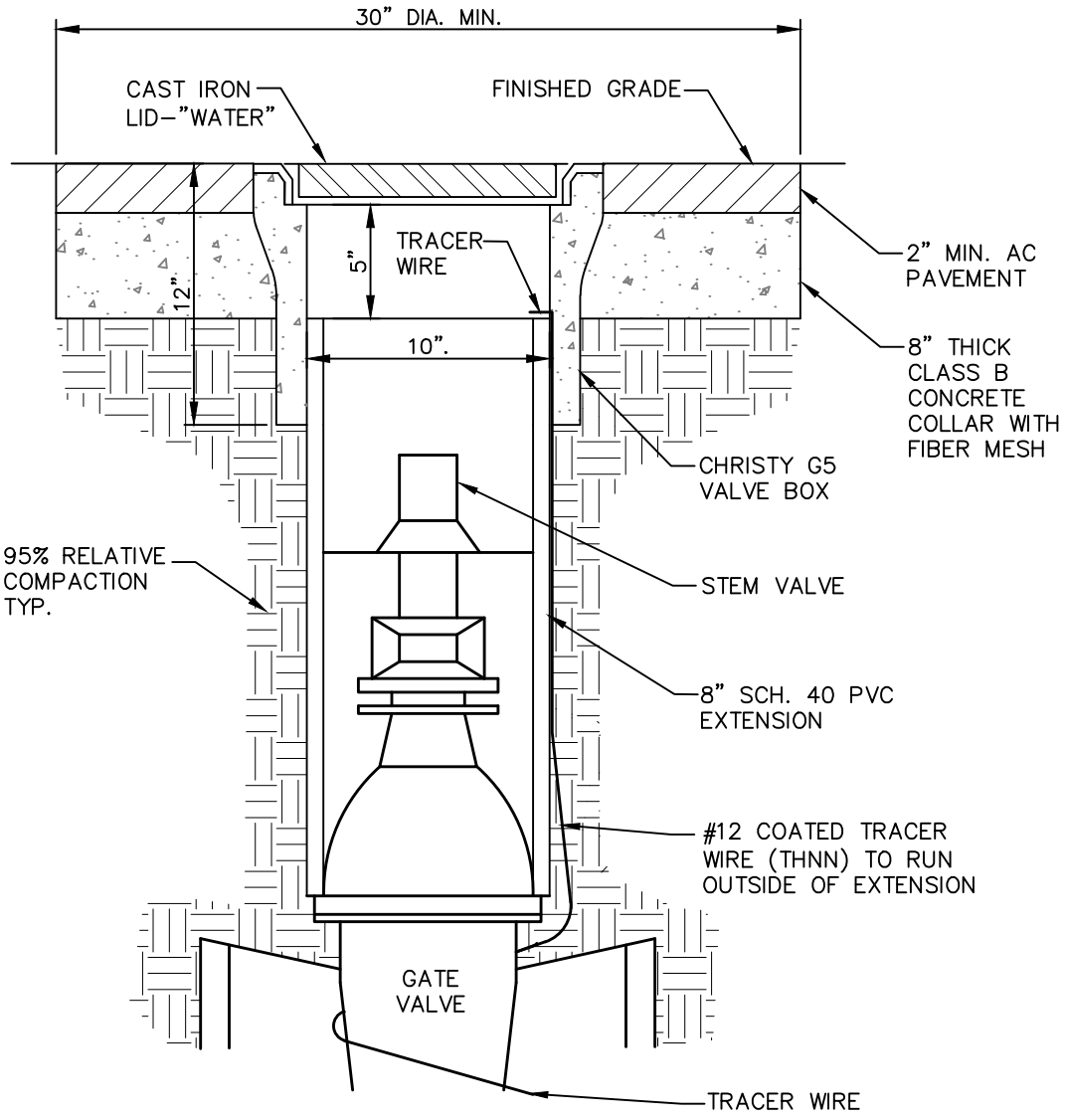
CITY OF CERES
ENGINEERING DEPARTMENT

APPROVED BY

CITY ENGINEER – DARYL JORDAN – RCE 58036

PLATE NO: W–6

COUNCIL APPROVAL DATE
DATE 03/26/2018



NOTES:

1. CLEAN INSIDE OF EXTENSIONS SO STEM IS CLEAN OF DIRT.
2. SET VALVE BOX TO FINISH GRADE
3. COMPACT EARTH AROUND BASE WITH MECHANICAL TAMPER TO 95% RELATIVE COMPACTION AND ENCASE IN 8" OF CONCRETE.
4. AFTER CONCRETE SETS, PATCH WITH 2" A.C.
5. IN TRAFFIC AREAS, CONCRETE SHALL BE MADE WITH TYPE 3, HIGH EARLY STRENGTH CEMENT BARRICADES SHALL BE REMOVED IN 24 HOURS.

WATER VALVE BOX DETAIL

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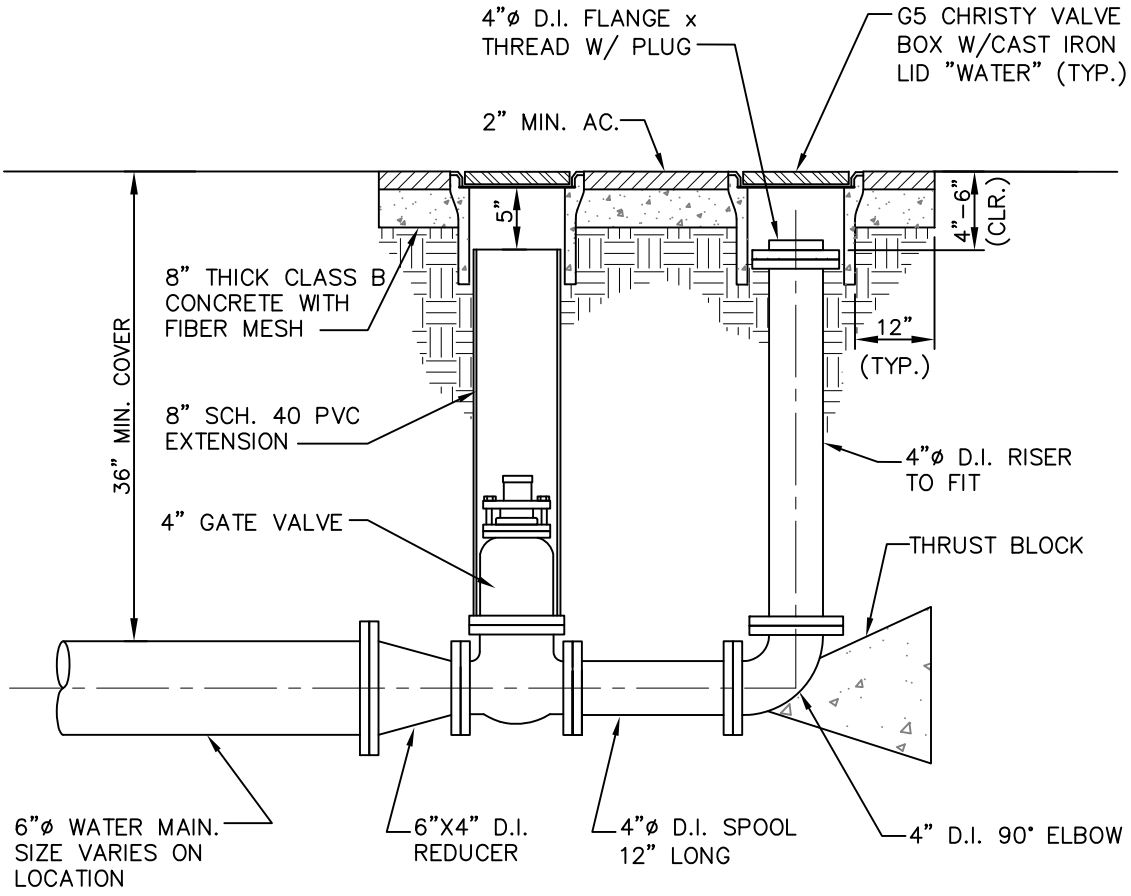
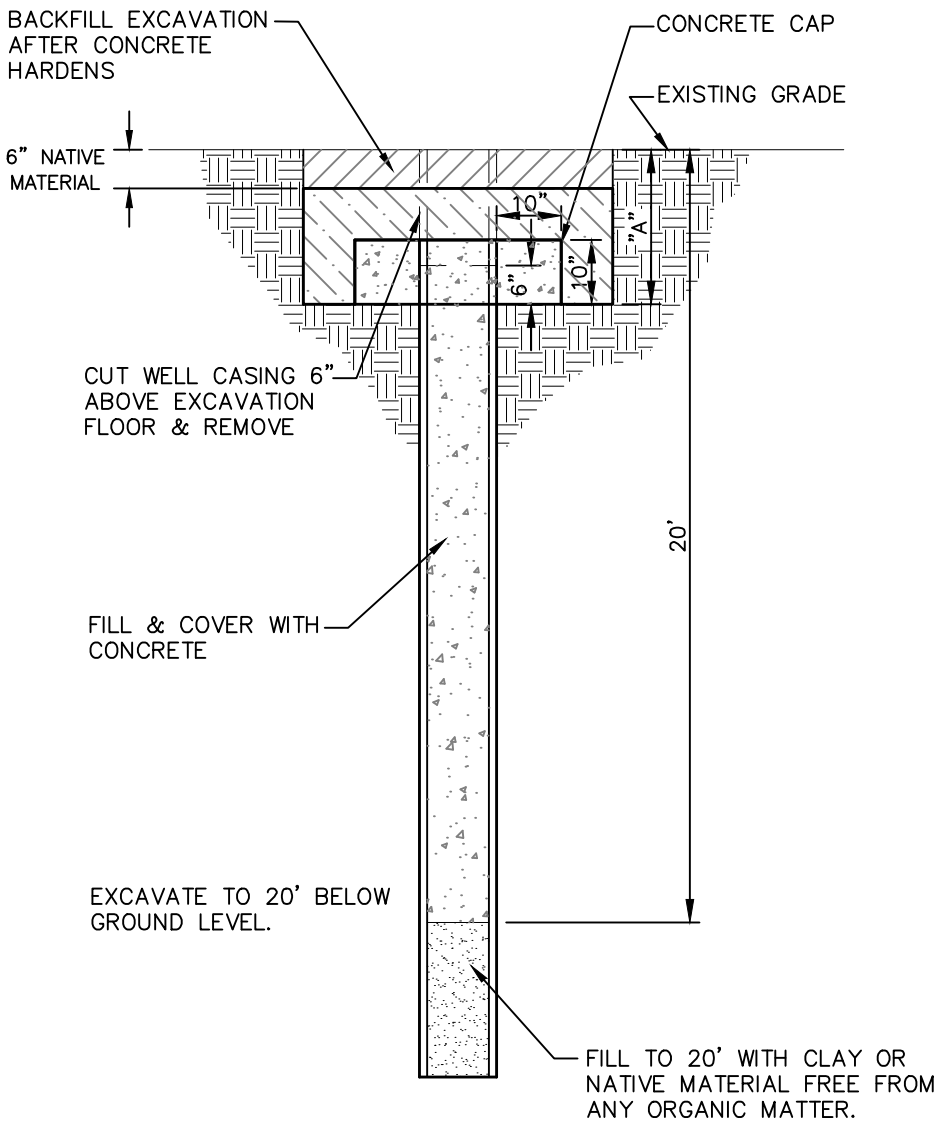
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



WATERLINE BLOWOFF ASSEMBLY – CONSTRUCTION USE ONLY

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: W-8
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

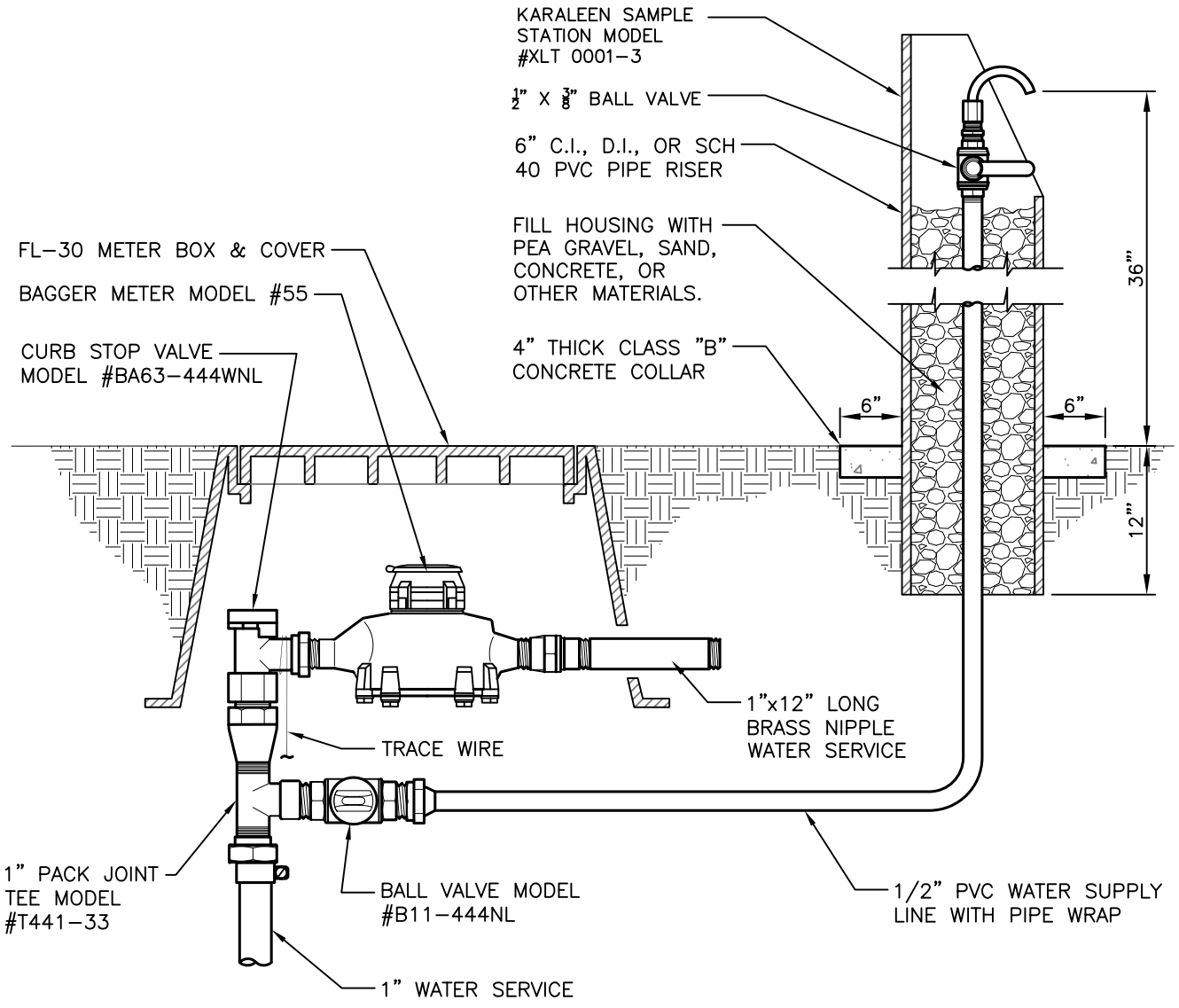


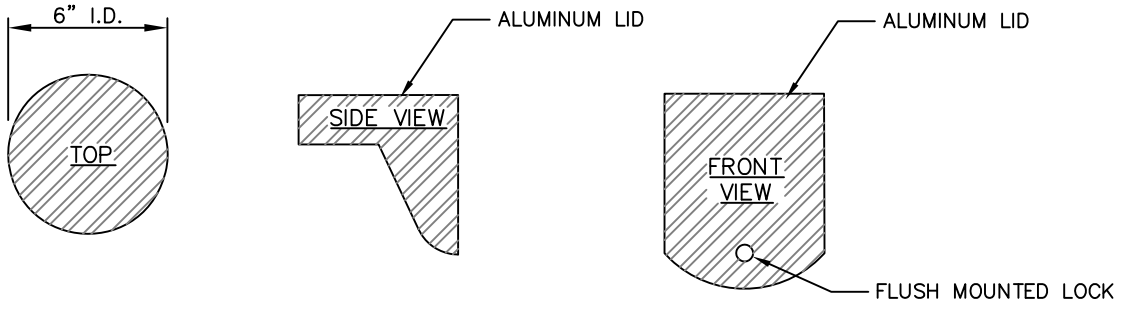
NOTES:

1. REFERENCE: CALIF. ADMIN. CODE TITLE 17 & WATER RESOURCES BULLETIN 74, WATER WELL STDS. SECTION 23.
2. ALL WORK TO BE INSPECTED AND APPROVED.
3. THE AMOUNT OF EXCAVATION REQUIRED, AS DENOTED BY DIMENSION "A", IS 60" FOR BUSINESS AND COMMERCIAL PROPERTY AND 24" FOR PRIVATE PROPERTY.
4. WELL DESTRUCTION SHALL CONFORM TO THE STANISLAUS COUNTY WELL ORDINANCE #443–SECTION 3–310 OF THE STANISLAUS COUNTY DEPARTMENT OF PUBLIC HEALTH.

PRIVATE WELL DESTRUCTION STANDARD

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: W–9
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018





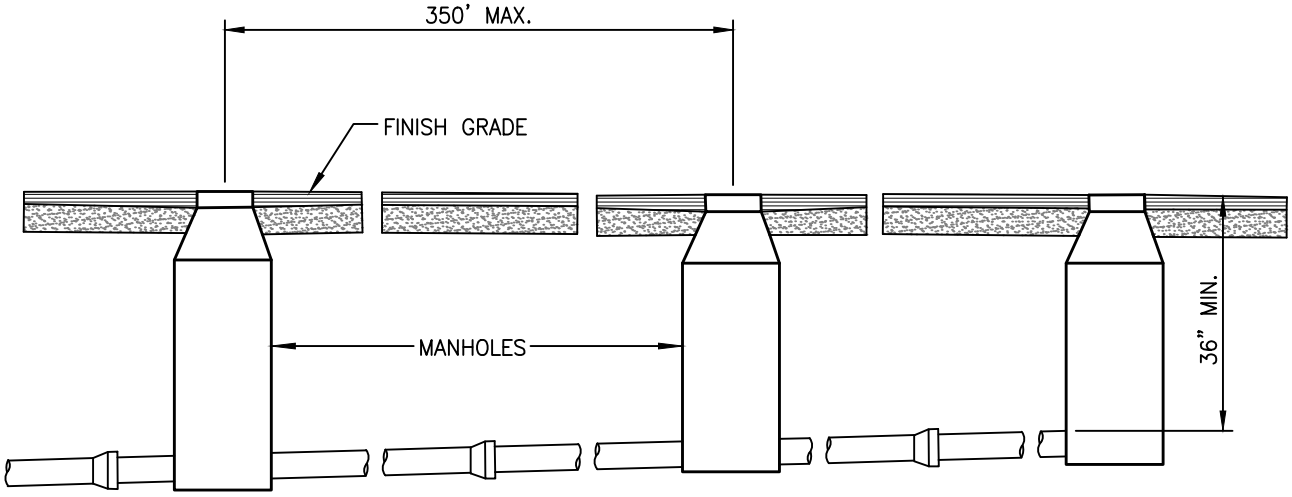
HOUSING VIEW

WATER QUALITY SAMPLING STATION

	PREPARED BY: SER	CITY OF CERES **ENGINEERING DEPARTMENT**	**PLATE NO:** W-10
	CHECKED BY: DRJ	**APPROVED BY**	**COUNCIL APPROVAL DATE**
	SCALE: NONE	**CITY ENGINEER – DARYL JORDAN – RCE** 58036	DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

SANITARY SEWER SYSTEM



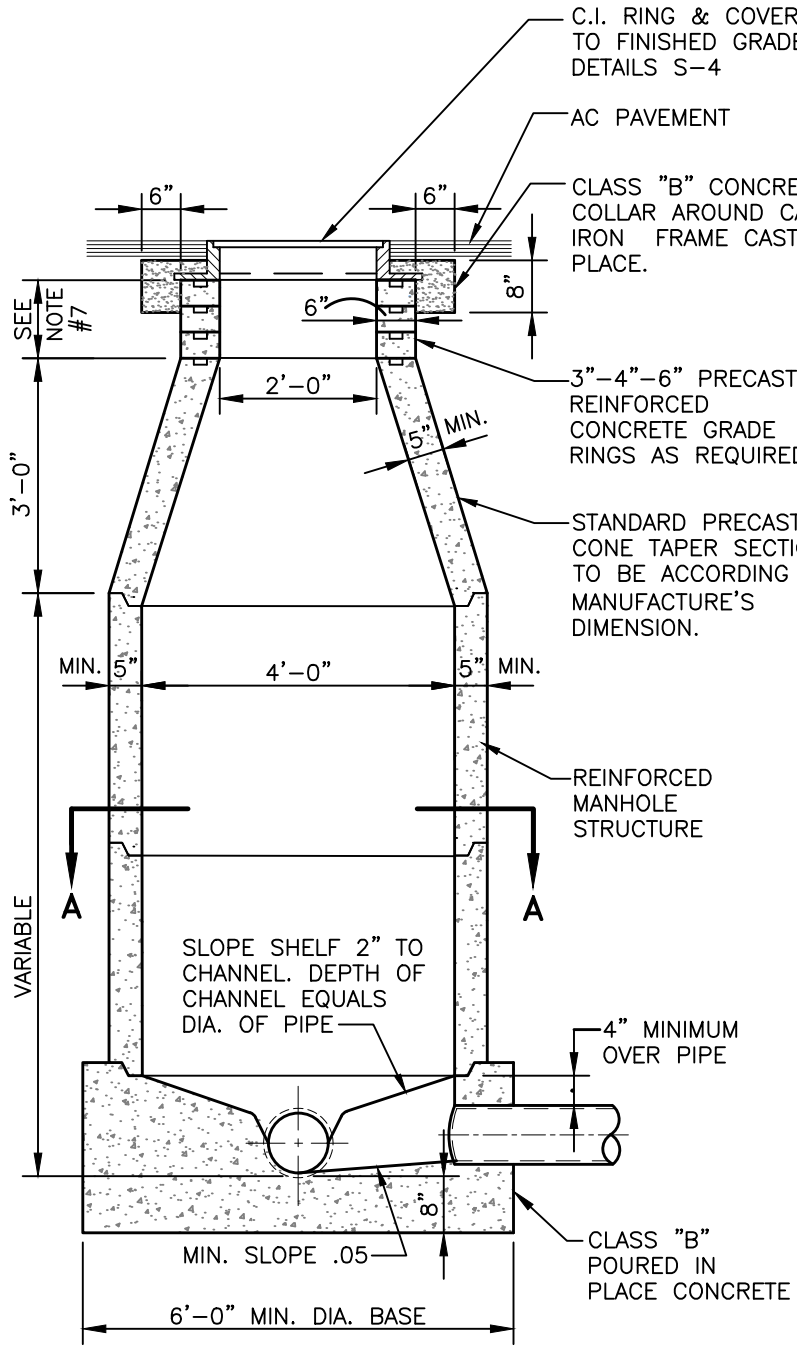
PIPE SIZE	MIN. SLOPE
6" DIA.	0.0036
8" DIA.	0.0029
10" DIA.	0.0021
12" DIA.	0.0017
15" DIA.	0.0012
18" DIA.	0.0009

NOTES:

1. SEWER MAIN SHALL BE DESIGNED FOR A MINIMUM VELOCITY OF 2.0 f.p.s. WHEN FLOWING FULL. VELOCITIES LESS THAN 2.0 f.p.s. MAY BE APPROVED BY THE CITY ENGINEER BASED ON DOCUMENTATION SUBMITTED BY THE DESIGN ENGINEER.
2. MINIMUM COVER SHALL BE 36 INCHES FROM FINISHED GRADE OF THE STREET. IF THIS MINIMUM COVER CANNOT BE OBTAINED, EPOXY COATED DUCTILE IRON PIPE SHALL BE INSTALLED.
3. MANHOLES SHALL BE INSTALLED AT THE END OF ALL LINES, WHERE SEWERS INTERSECT, AT CHANGES IN LINE SIZE OR MATERIAL AND AT SERVICE CONNECTIONS LARGER THAN 4" IN DIAMETER.
4. ALL SERVICE CONNECTIONS TO SEWERS SHALL BE MADE AT WYES.
5. THE ENGINEERING DIVISION SHALL BE SUPPLIED WITH AN "AS-BUILT" PLAN SHOWING LOCATION OF ALL LATERALS AND INVERT ELEVATIONS.
6. A MANHOLE SHALL BE INSTALLED AT ALL CONNECTIONS TO A TRUNK LINE.

SANITARY SEWER DATA

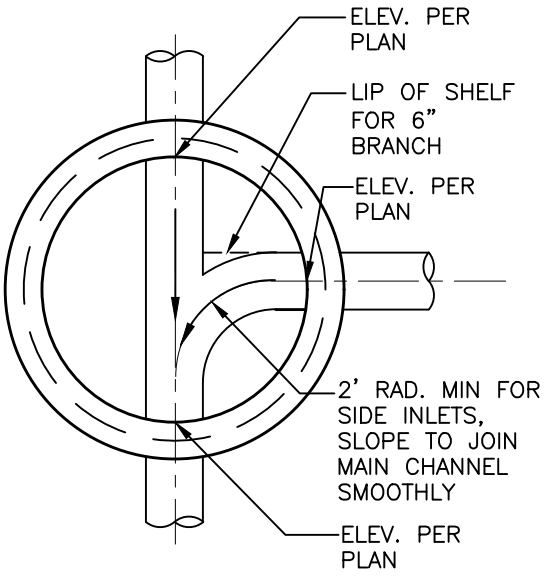
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: S-1 COUNCIL APPROVAL DATE DATE 03/26/2018



CONCENTRIC STRUCTURE

NOTES:

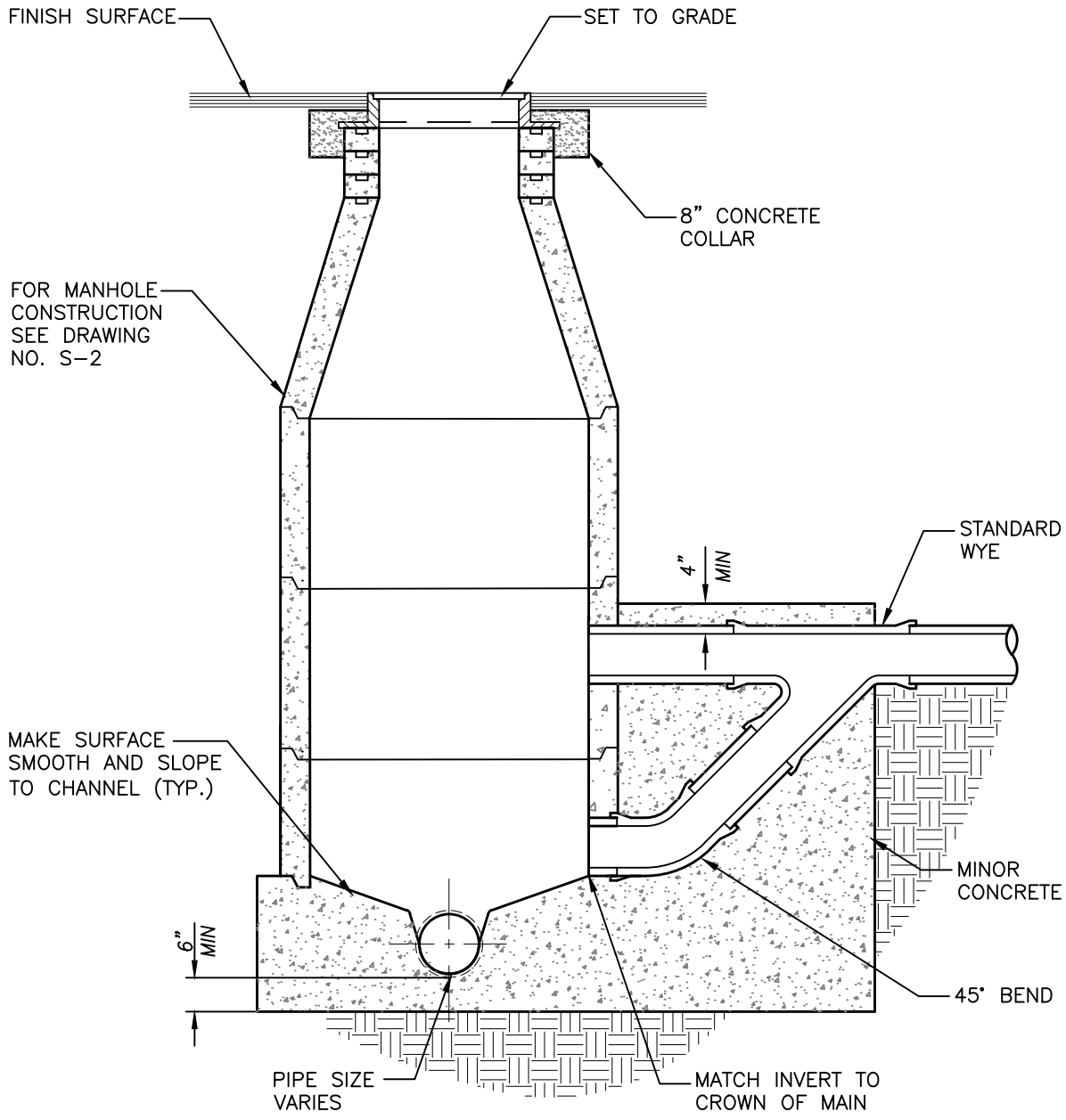
1. MANHOLE DIAMETER SHALL BE 48" WHEN SERVING PIPES 24" IN DIAMETER OR SMALLER. MANHOLE DIAMETER SHALL BE 60" WHEN SERVING PIPES LARGER THAN 24" IN DIAMETER.
2. SEE STANDARD DWG. S-3 FOR DROP MANHOLE DETAIL.
3. THE DEPTH OF CHANNELS FLOWING INTO THE MAIN LINE SHALL BE NO DEEPER THAN HALF IT'S PIPE DIAMETER
4. ALL JOINTS SHALL BE SET WITH RAMNEK, OR APPROVED EQUAL, AND GROUTED.
5. ECCENTRIC CONE MAY BE USED WHERE APPROVED BY CITY ENGINEER.
6. MANHOLE BARREL & BASE FOR TRUNK LINE 15" & LARGER SHALL BE COMPOSITE MATERIAL.
7. ADDITIONAL GRADE RINGS MAY BE USED TO 30" MAX.



SECTION A-A

SANITARY SEWER MANHOLE

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: S-2
CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

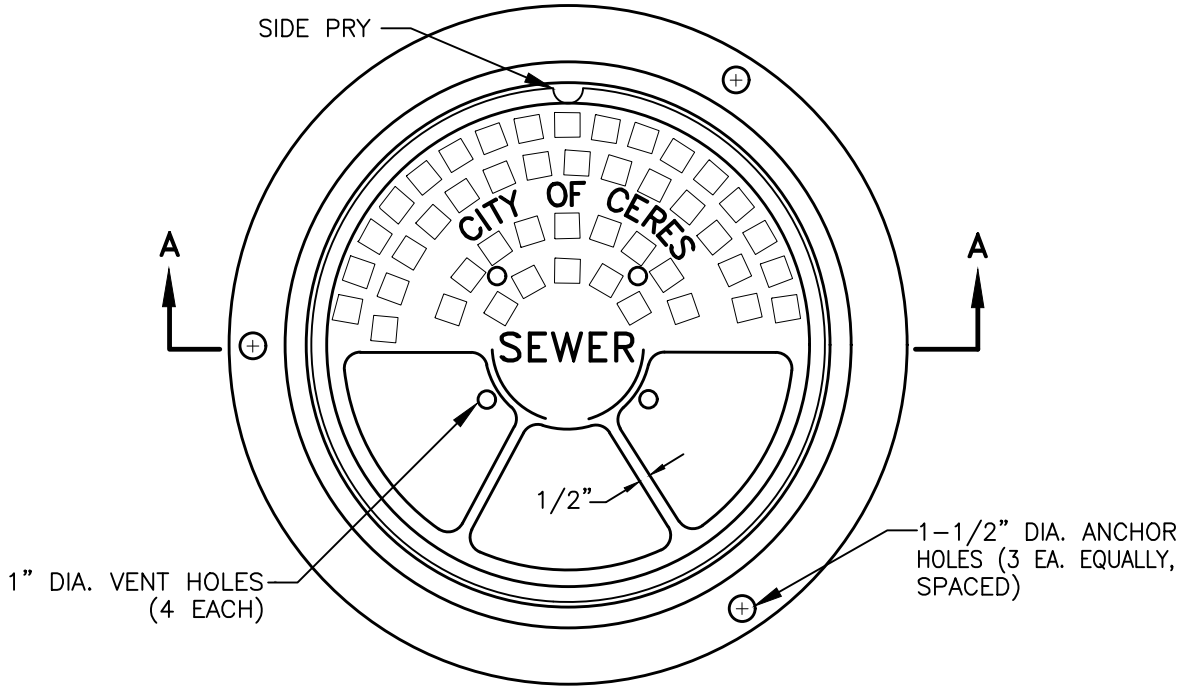


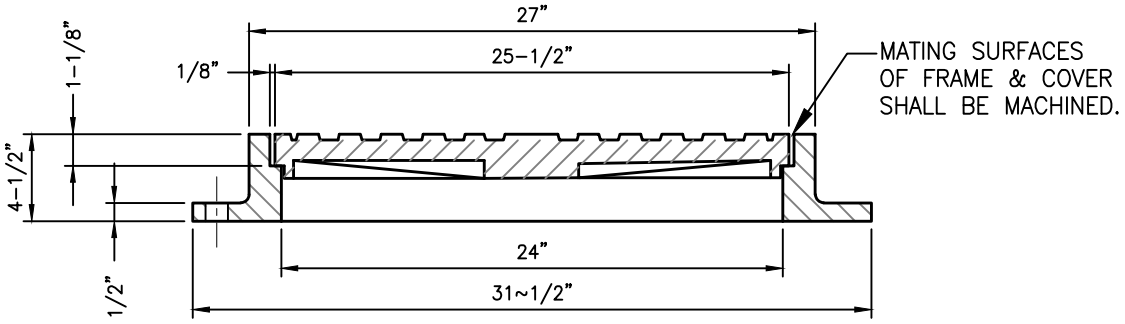
NOTE:

1. DROP MANHOLE SHALL BE USED WHEN THE SLOPE OF THE LINE WOULD EXCEED 2%, OR AS APPROVED BY CITY ENGINEER.
2. ALTERATIONS MAY BE REQUIRED BY CITY ENGINEER.

STANDARD DROP MANHOLE

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: S-3
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018





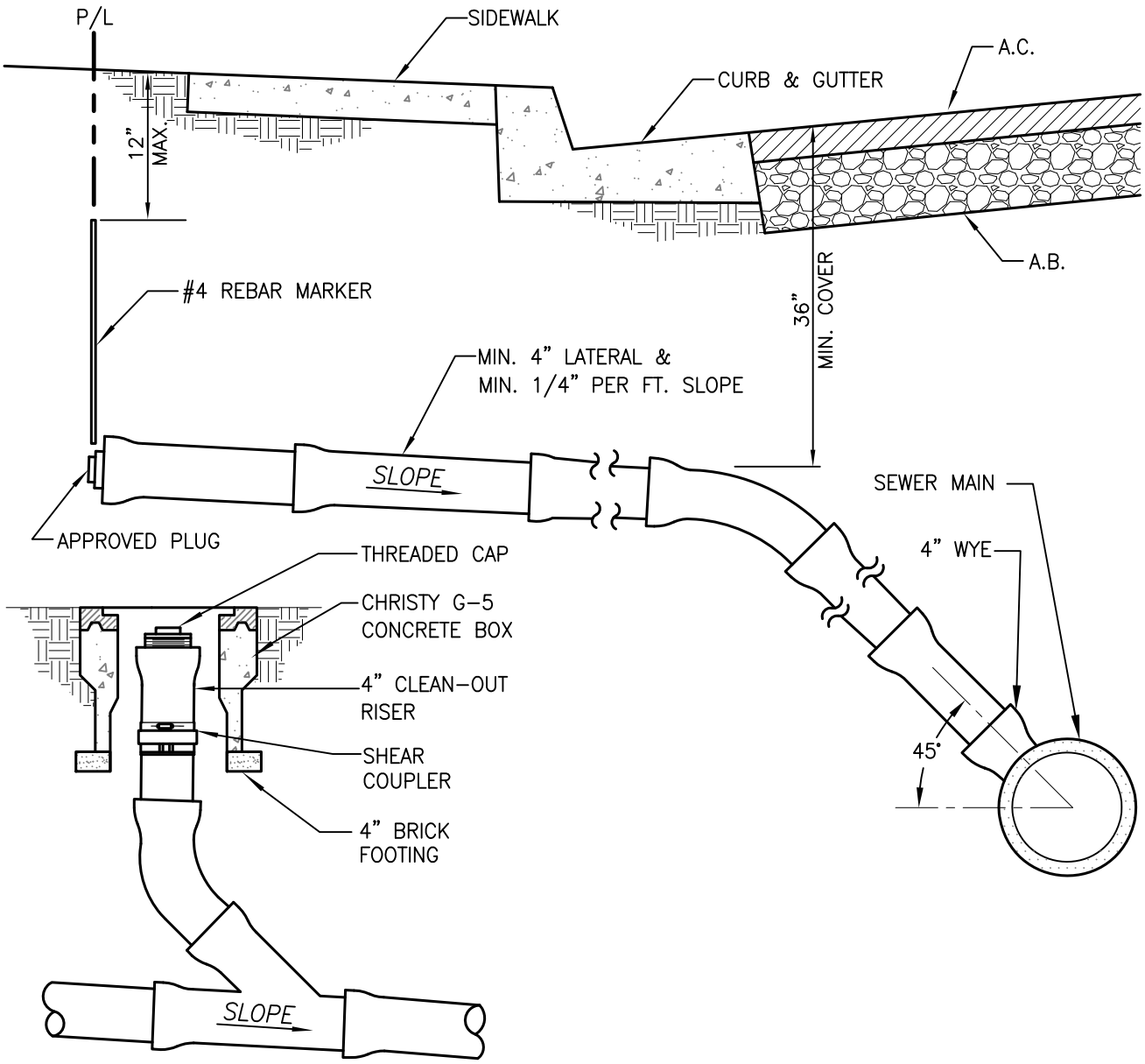
SECTION A-A

NOTES:

1. CAST IRON SHALL HAVE A TENSILE STRENGTH OF 38,000 PSI.
2. FRAME SHALL BE SET TO FINISH GRADE
3. SOUTH BAY FOUNDRY FRAME AND LID NO. 624/106 OR APPROVED EQUAL FOR SANITARY SEWER & STORM DRAIN.
4. EACH MANHOLE COVER SHALL BE STAMPED "SEWER" OR "STORM" AND "CITY OF CERES" WITH 1" TO 2" LETTERING.
5. WEIGHT OF LID SHALL BE 100 POUNDS MINIMUM.

MANHOLE FRAME & COVER

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: S-4
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



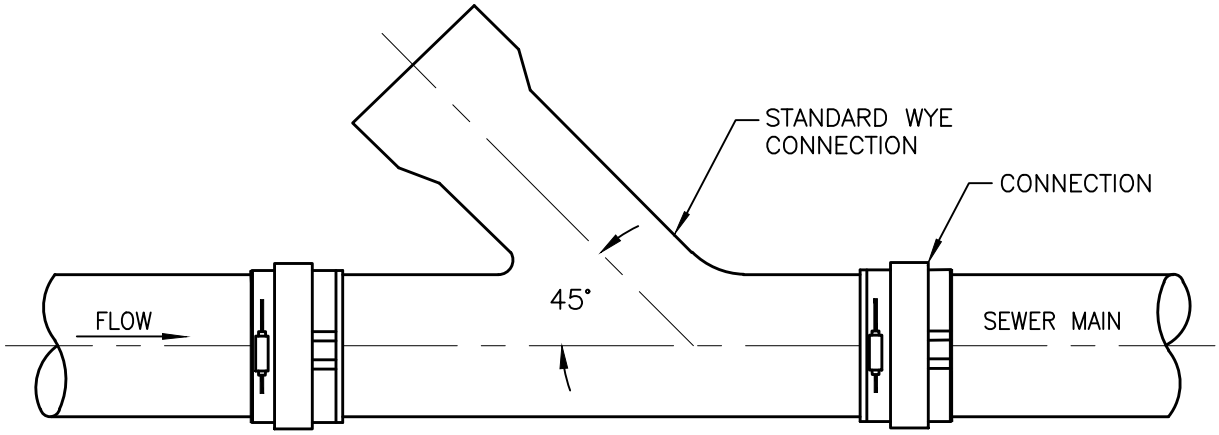
SEWER SERVICE CLEANOUT

NOTES:

1. A LETTER 'S' (3" HIGH) SHALL BE STAMPED ON CURB FACE OVER CONNECTION PIPE.
2. RESIDENTIAL CONNECTIONS IN STREETS SHALL BE INSTALLED TO PROPERTY LINE.
3. CONNECTIONS IN ALLEYS SHALL BE INSTALLED TO PROPERTY LINE.
4. HOUSE LATERALS SHALL BE EITHER POLYVINYL CHLORIDE (P.V.C.) OR VITRIFIED CLAY PIPE (V.C.P).
5. SEWER SERVICE CLEANOUT TO BE INSTALLED WHEN HOUSE SERVICE LATERAL IS CONNECTED, 12" BACK OF SIDEWALK ON PROPERTY LINE SIDE.

HOUSE SERVICE LATERAL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: S-5
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

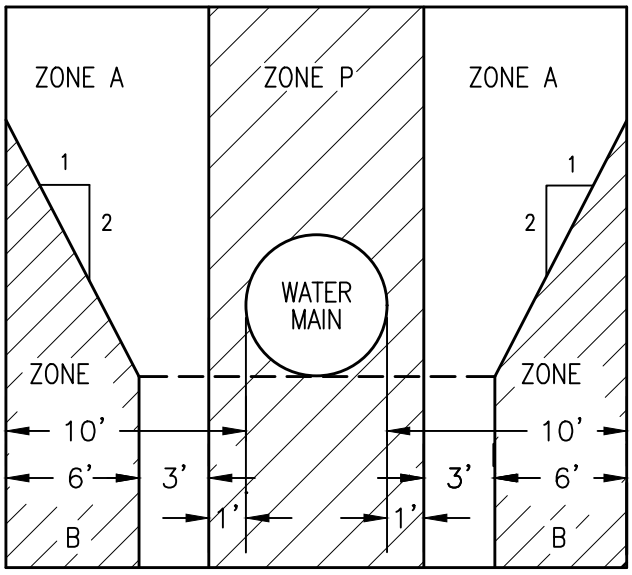


SEWER LATERAL CONNECTION
(CUT – IN WYE)

NOTE:
USE 4 INCH WIDE MINIMUM SHEAR COUPLERS AT CONNECTION TO SEWER MAIN.

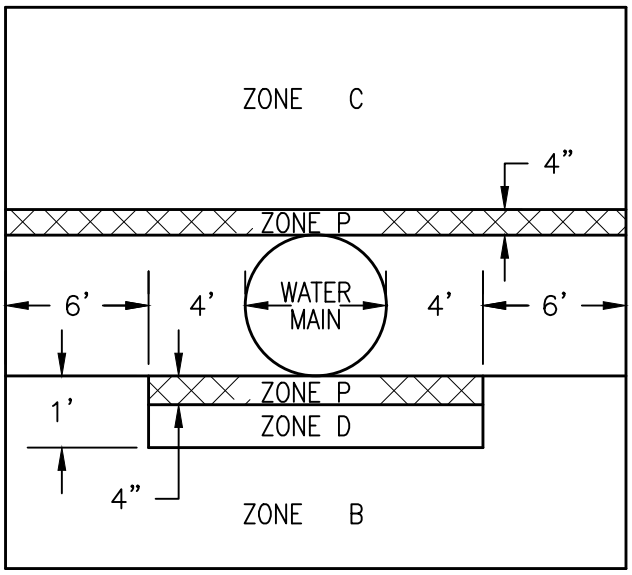
SERVICE LATERAL CONNECTION

CITY OF CERES – TOGETHER WE ACHIEVE	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: S-6 COUNCIL APPROVAL DATE DATE 03/26/2018



PARALLEL CONSTRUCTION

IF A MAIN LINE SEWER CANNOT BE LOCATED TEN FEET OR MORE FROM A PRESSURE WATER MAIN AND MUST BE LOCATED WITHIN ANY OF THE ABOVE ZONES, SPECIAL CONSTRUCTION WILL BE REQUIRED AS CALLED OUT BELOW.



PERPENDICULAR CONSTRUCTION

IF A MAIN LINE SEWER MUST CROSS A PRESSURE WATER MAIN IN ANY OF THE ZONES ABOVE, SPECIAL CONSTRUCTION WILL BE REQUIRED AS CALLED OUT BELOW.

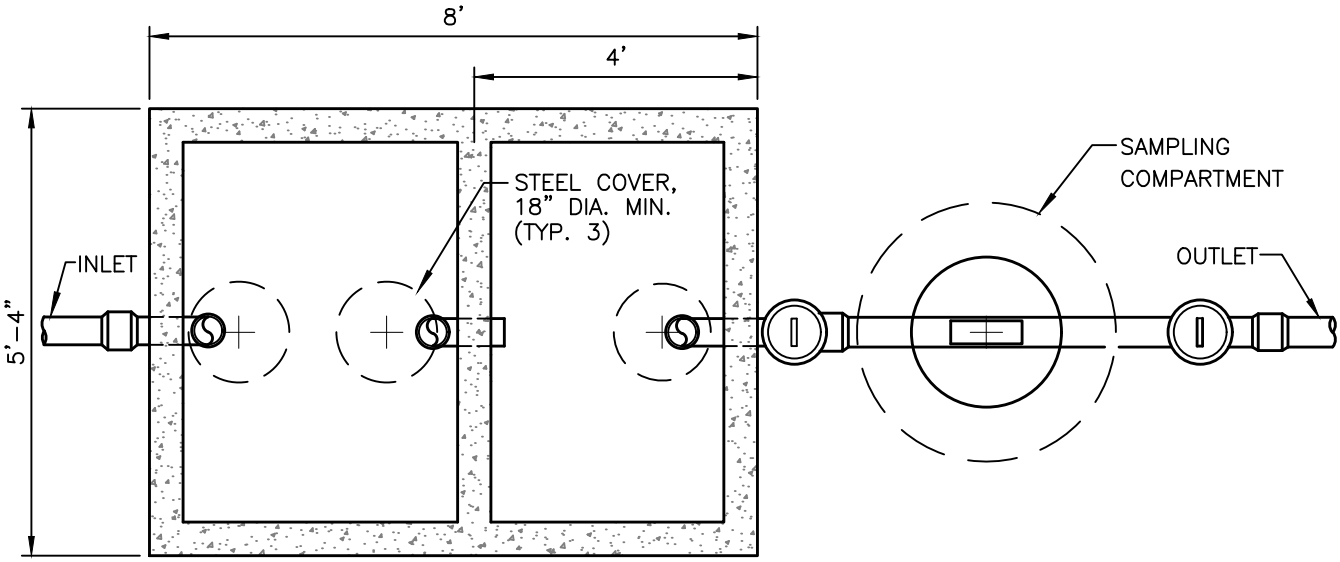
ZONE	SEWER CONSTRUCTION REQUIREMENTS
B	V.C.P. WITH APPROVED COUPLINGS
C or D	D.I.P. WITH HOT-DIPPED, BITUMINOUS COATING. NO JOINTS WITHIN ZONE.
A	DO NOT LOCATE ANY PARALLEL SEWERS IN THIS AREA WITHOUT THE APPROVAL OF THE CITY ENGINEER.
P	SEWER CONSTRUCTION PROHIBITED

NOTES:

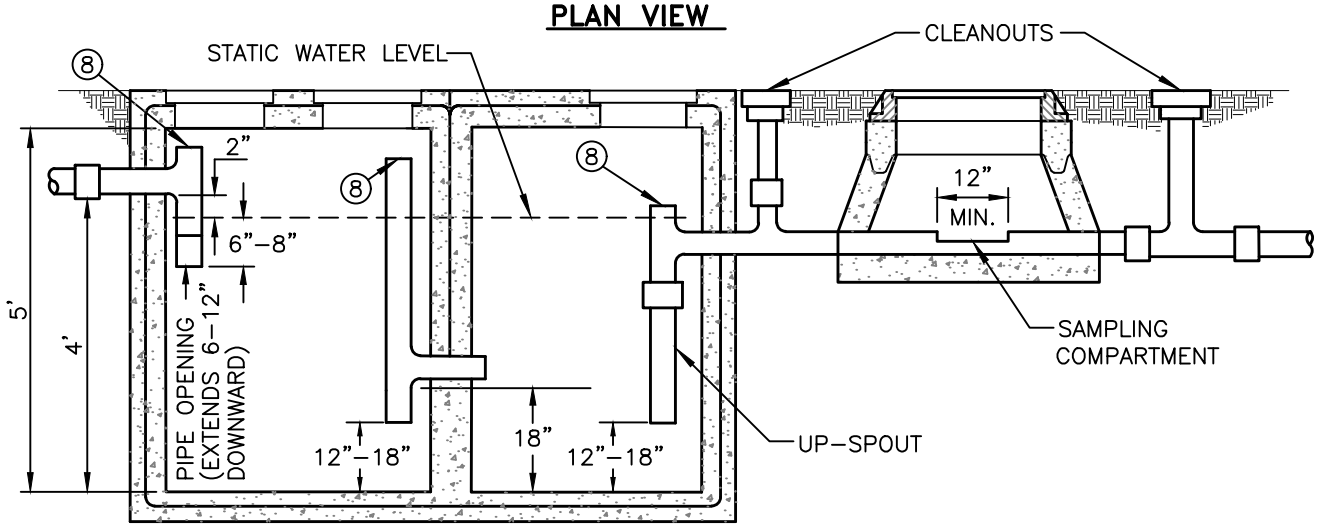
1. PARALLEL CONSTRUCTION OF FORCE SEWER MAINS WILL NOT BE PERMITTED IN ANY ZONE.
2. PERPENDICULAR CONSTRUCTION OF SEWER FORCE MAIN IN ANY ZONE REQUIRES D.I.P. WITH APPROVED MECHANICAL COUPLINGS.
3. COUPLINGS SHALL BE CERAMIC, BAND SEAL OR APPROVED EQUAL.
4. FOR ENCASEMENT DETAILS SEE STANDARD DETAILS

REQUIREMENTS OF SANITARY SEWER IN VICINITY OF WATER MAIN

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: S-7 COUNCIL APPROVAL DATE DATE 03/26/2018



PLAN VIEW



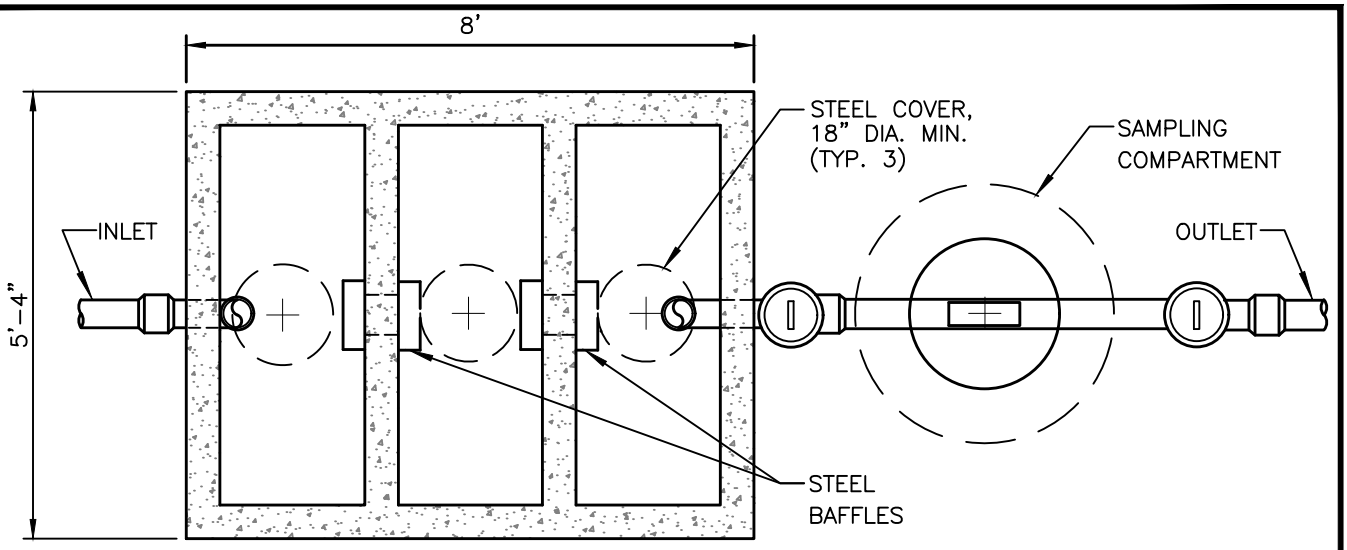
SECTION VIEW

NOTES:

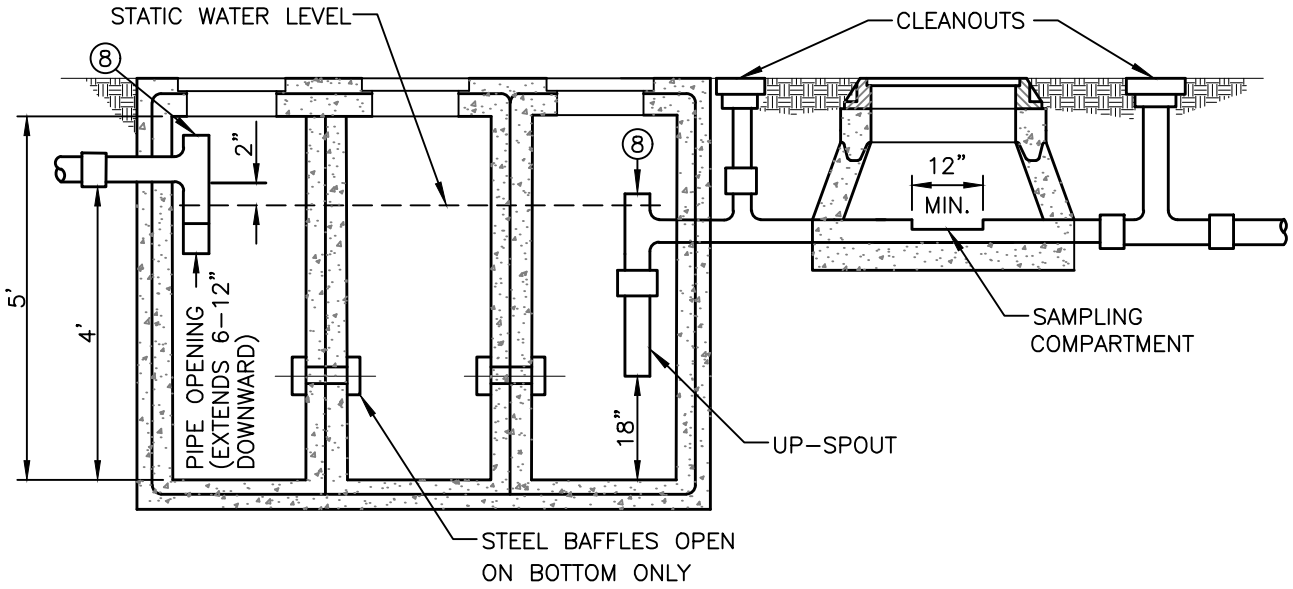
1. DIMENSIONS SHOWN ARE FOR MINIMUM SIZE TRAP (750 GALLON).
2. WHEN A LARGER SIZE IS REQUIRED, THE UNIT SHALL BE DESIGNED BY A REGISTERED CIVIL ENGINEER AND APPROVED BY THE CITY ENGINEER.
3. CONCRETE SHALL BE MINIMUM 3000 PSI AT 28 DAYS.
4. A SAMPLING COMPARTMENT IS REQUIRED, THE CITY ENGINEER MAY WAIVE THE REQUIREMENT IF A HARDSHIP EXISTS.
5. COVERS SHALL BE STEEL AND SHALL BE GAS TIGHT.
6. ALL WASTE SHALL ENTER TRAP THROUGH THE INLET PIPE ONLY.
7. REINFORCEMENT SHALL BE ADEQUATE FOR TRAFFIC CONDITIONS IN AREA WHERE TRAP IS LOCATED.
8. TEES SHALL BE ACCESSIBLE FOR CLEANING THROUGH THE ACCESS COVERS.

TYPICAL GREASE INTERCEPTOR

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: S-8 COUNCIL APPROVAL DATE DATE 03/26/2018



PLAN VIEW



SECTION VIEW

NOTES:

1. DIMENSIONS SHOWN ARE FOR MINIMUM SIZE TRAP (750 GALLON).
2. WHEN A LARGER SIZE IS REQUIRED, THE UNIT SHALL BE DESIGNED BY A REGISTERED CIVIL ENGINEER AND APPROVED BY THE CITY ENGINEER.
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4. A SAMPLING COMPARTMENT IS REQUIRED, THE CITY ENGINEER MAY WAIVE THE REQUIREMENT IF A HARDSHIP EXISTS.
5. COVERS SHALL BE STEEL AND SHALL BE GAS TIGHT.
6. ALL WASTE SHALL ENTER TRAP THROUGH THE INLET PIPE ONLY.
7. REINFORCEMENT SHALL BE ADEQUATE FOR TRAFFIC CONDITIONS IN AREA WHERE TRAP IS LOCATED.
8. TEES SHALL BE ACCESSIBLE FOR CLEANING THROUGH THE ACCESS COVERS.

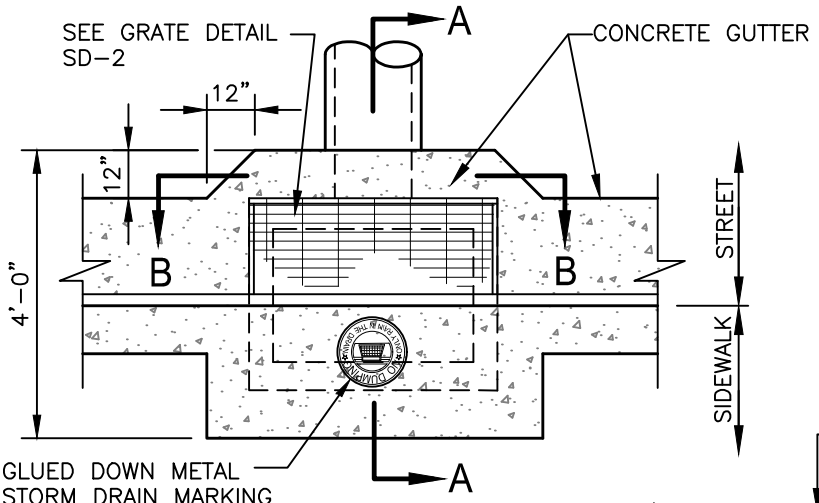
TYPICAL SAND & OIL INTERCEPTOR

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: S-9
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

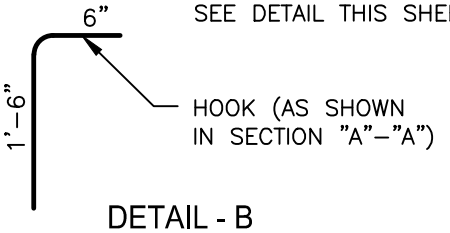
STORM DRAIN SYSTEM

SD-01	Storm Drop Inlet
SD-02	Grate Detail for Storm D.I.
SD-03	Storm Drain Manhole Detail
SD-04	Standard Drywell Drainage Unit
SD-05	Storm Drain Junction Structure
SD-06	Standard Manhole over Pipe
SD-07	Standard Transition Structure
SD-08	PCC Collar Connection
SD-09	French Drain Detail
SD-10A	Standard Drainage Basin
SD-10B	Drainage Basin Details
SD-10C	Catch Basin Details
SD-11	Curb Drain under Sidewalk
SD-12A	Storm Drainage Standard Design
SD-12B	Storm Drainage Standard Design

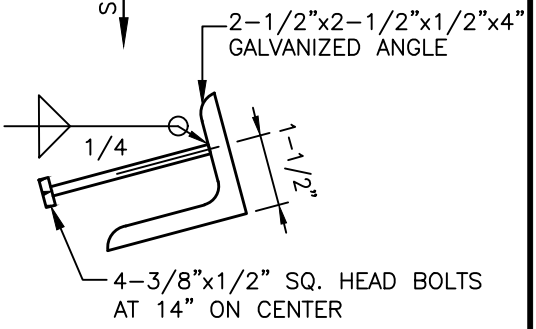


PLAN

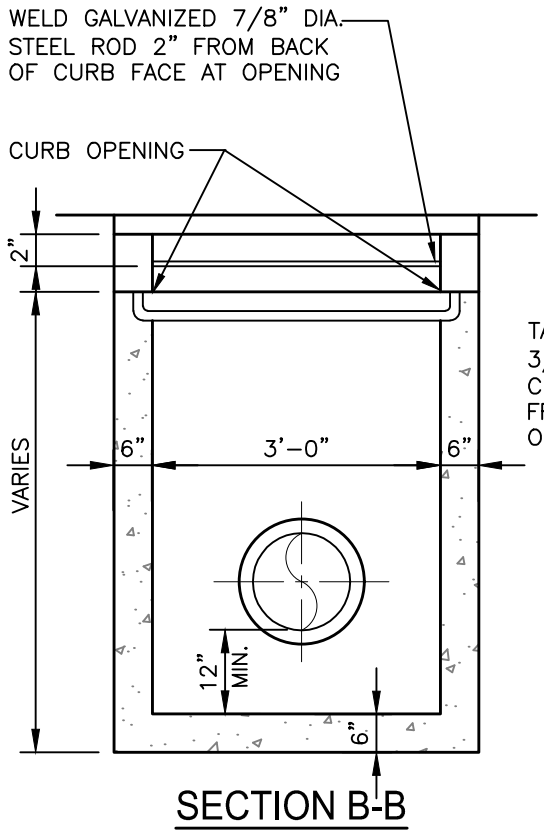
STORM DRAIN MARKING DETAIL



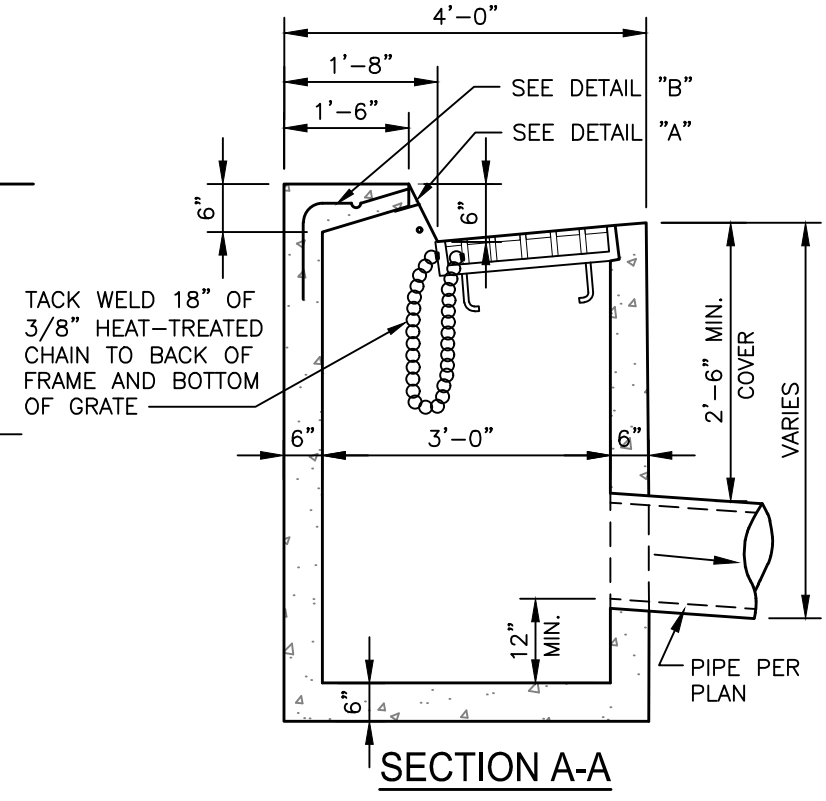
DETAIL - B



DETAIL - A



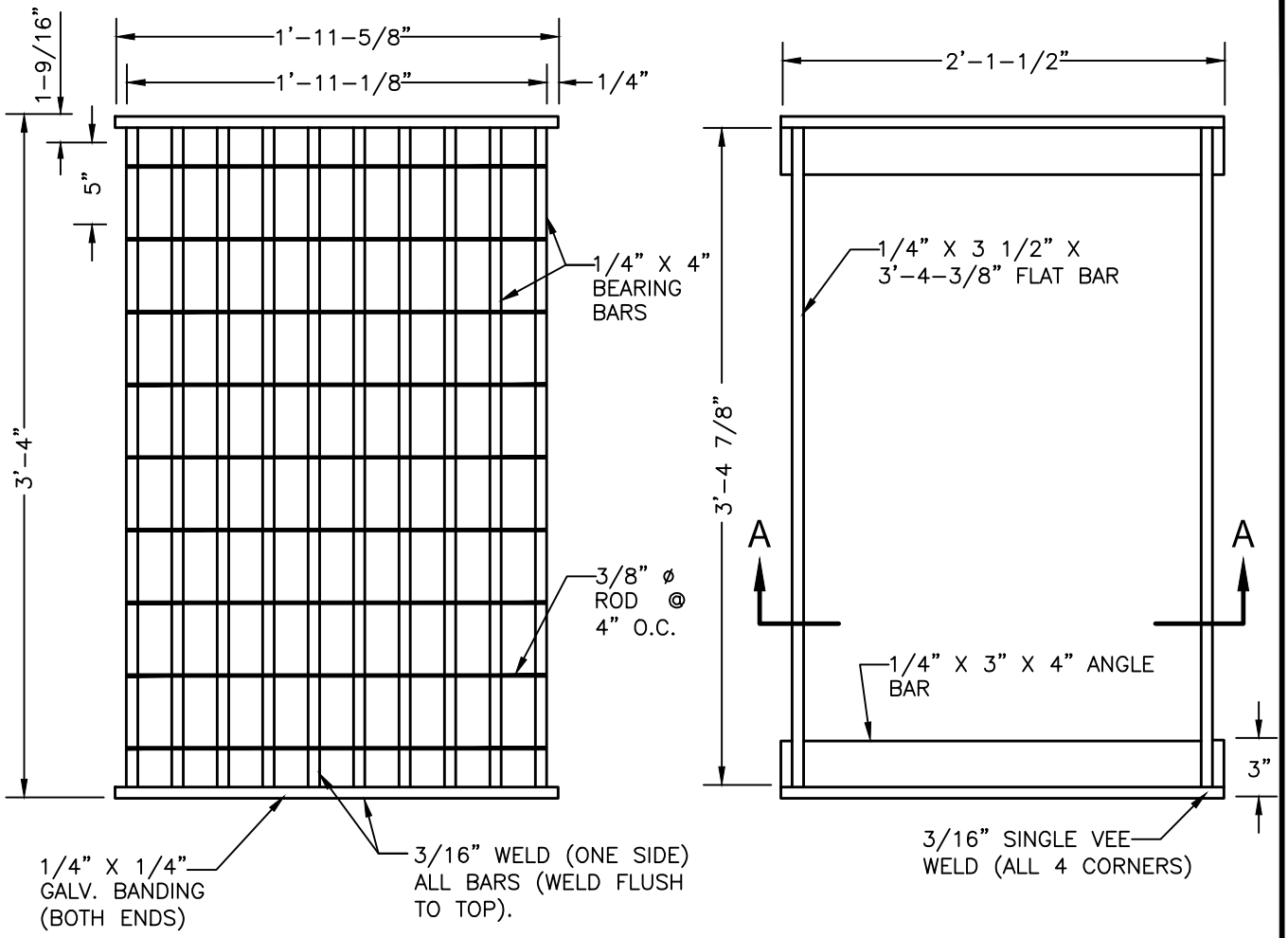
SECTION B-B



SECTION A-A

STORM DROP INLET

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-1
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



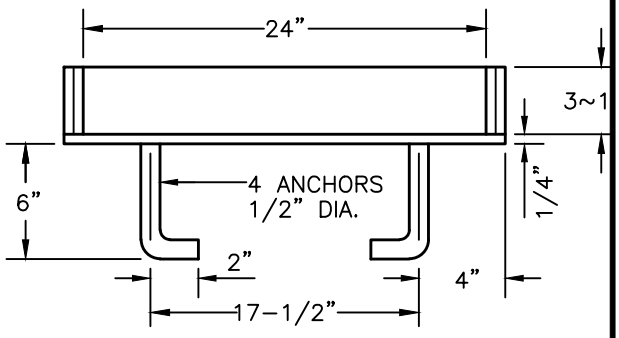
GRATE

PLAN VIEW

FRAME

NOTES:

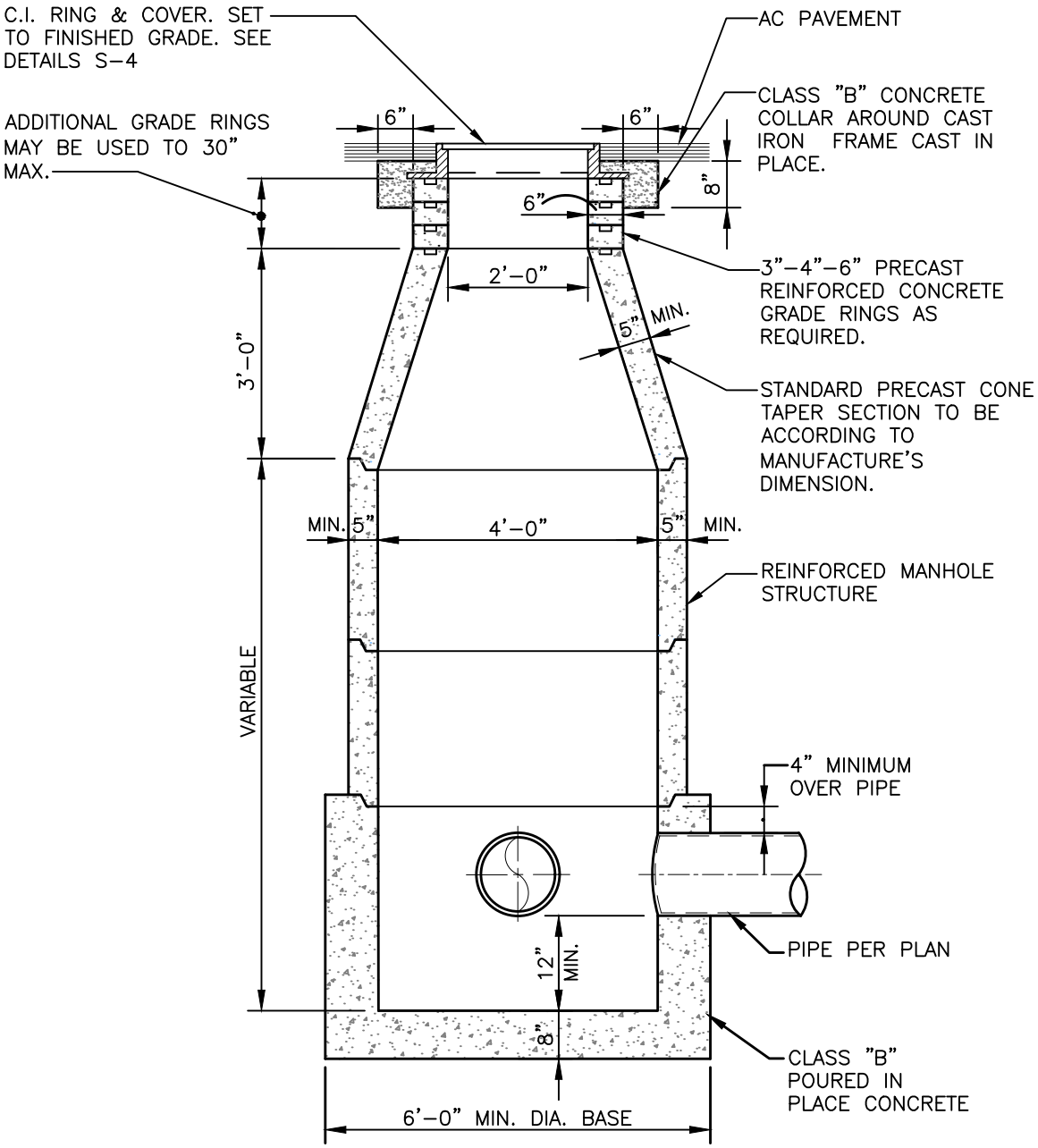
1. PLACE GRATE BARS PARALLEL TO CURB LINE.
2. ALL MISCELLANEOUS IRON AND STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
3. 3/8" DIA. RIVETS SHALL BE PLACED AT 5" ON CENTER THROUGH BEARING BARS.
4. OPEN AREA = 79.8%
5. IRVING GRATE TYPE "V" BANDED & GALVANIZED, STATE STANDARD NO. 24-10S, OR APPROVED EQUAL.
6. GRATE SHALL BE CHAINED TO CATCH BASIN.



SECTION A-A

GRATE DETAIL FOR STORM D.I.

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: SD-2
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



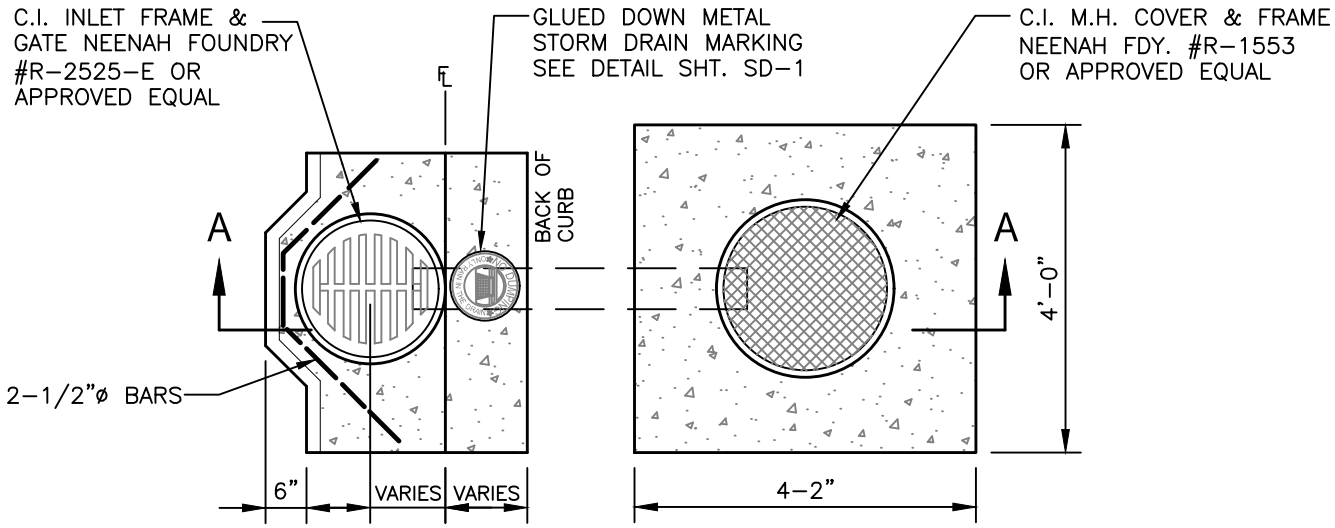
CONCENTRIC STRUCTURE

GENERAL NOTE:

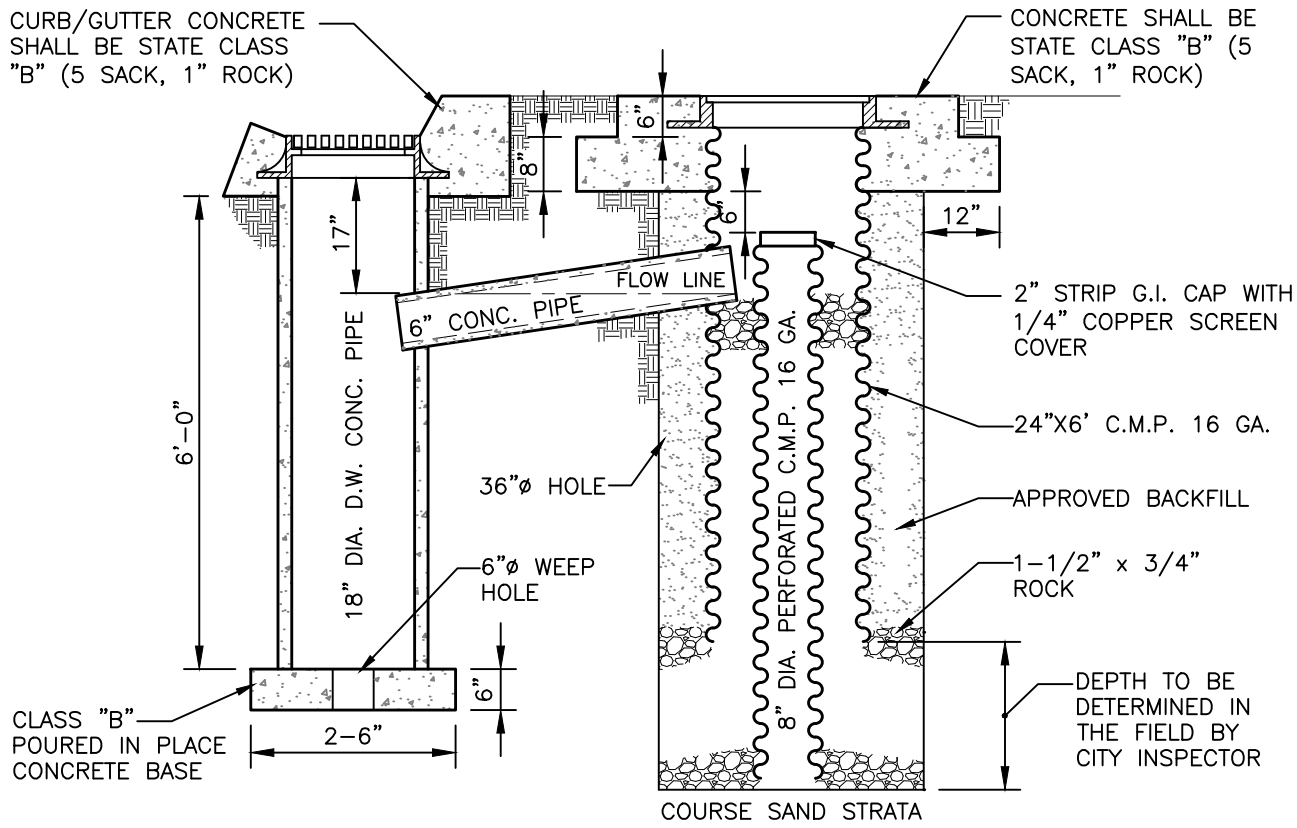
1. ECCENTRIC CONE MAY BE USED WHERE APPROVED BY THE CITY ENGINEER.

STORM DRAIN MANHOLE DETAIL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-3
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



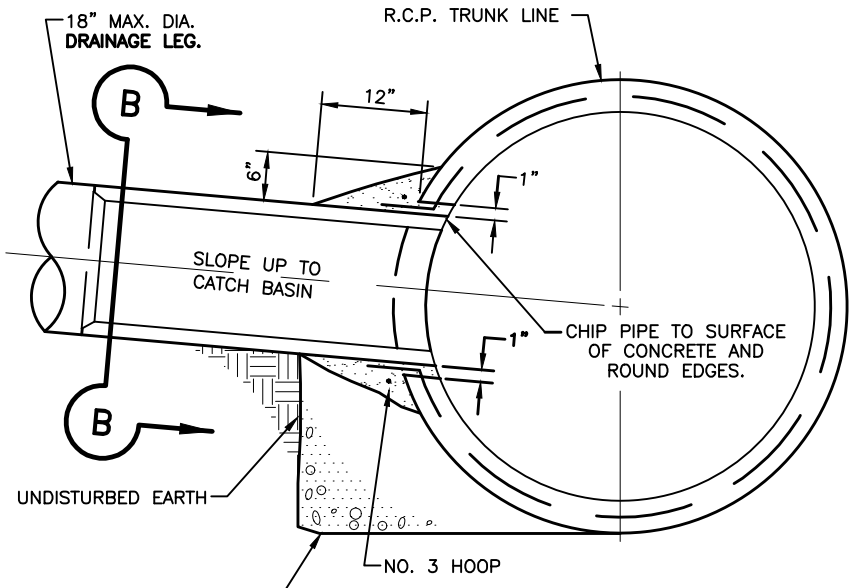
PLAN



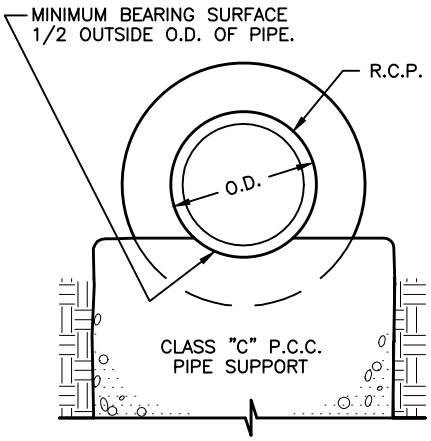
SECTION A-A

STANDARD DRYWELL DRAINAGE UNIT

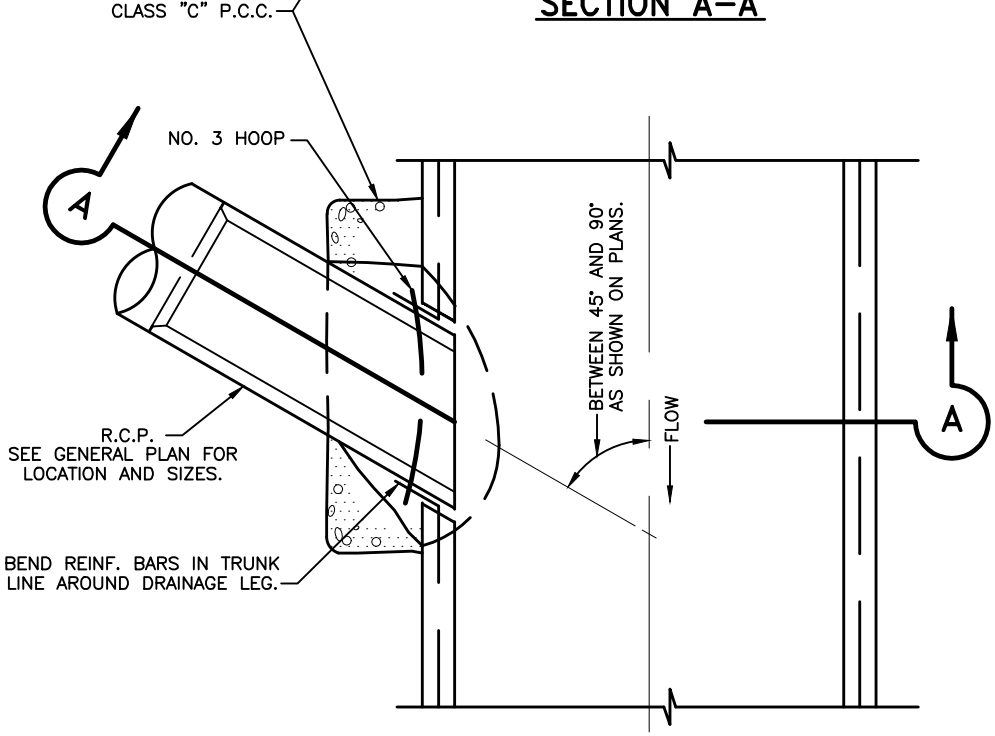
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-4
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



SECTION A–A



SECTION B–B

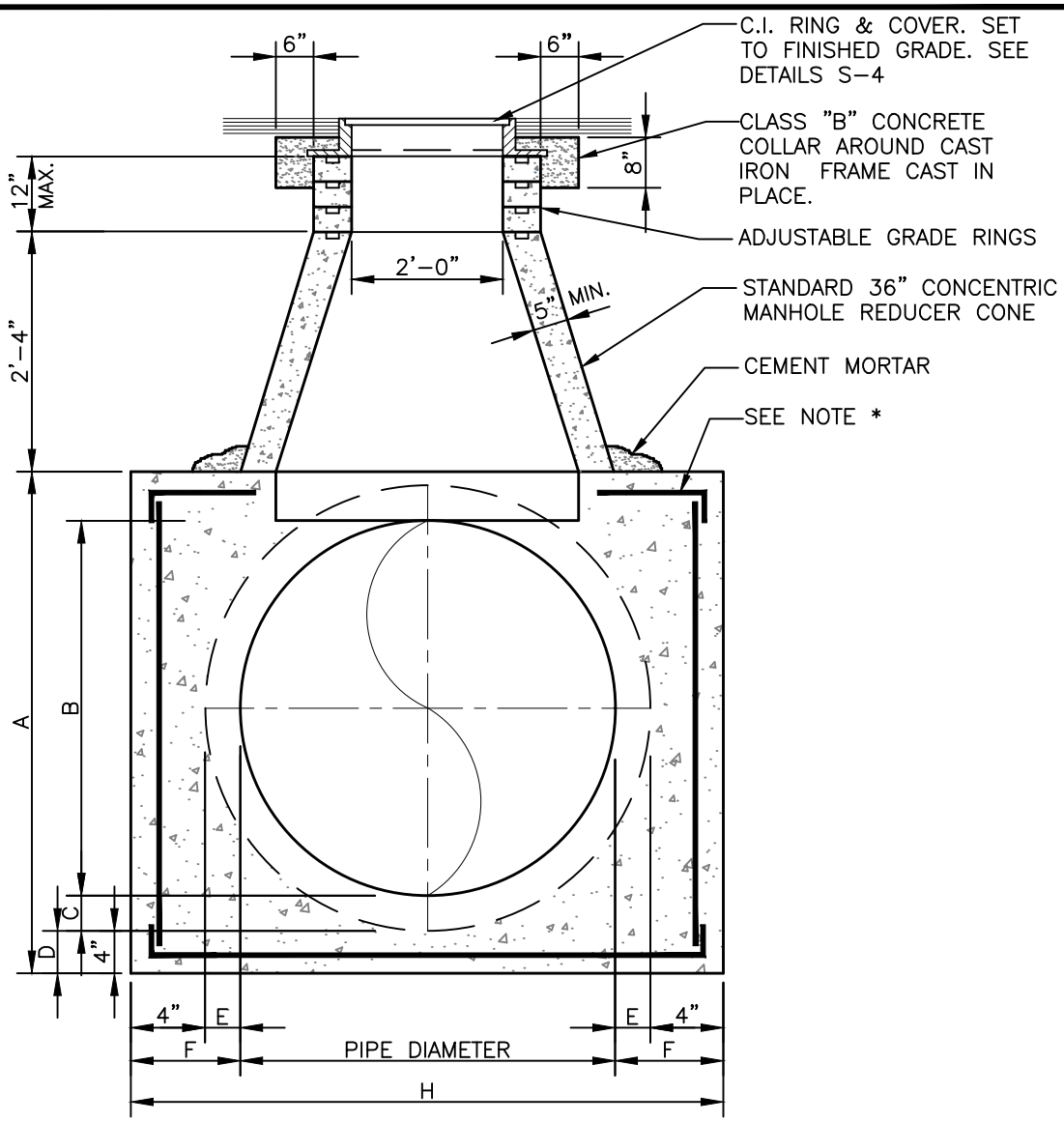


PLAN

NOTE:
ALSO APPLIES TO HORIZONTAL PIPE
ENTERING A VERTICAL CONCRETE SHAFT.

STORM DRAIN JUNCTION STRUCTURE

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-5
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



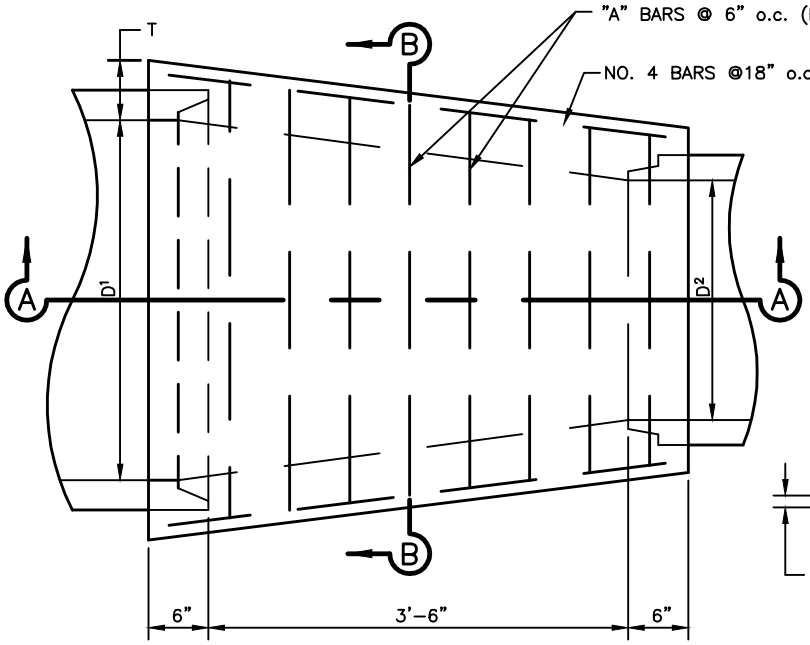
PIPE DIA	A	B	C	D	E	F	H
36	49-1/2	36	3-1/2	7-1/2	4-1/2	8-1/2	53
42	56	42	4	8	5	9	60
48	63	48	5	9	6	10	68
54	69-1/2	54	5-1/2	9-1/2	6-1/2	10-1/2	75
60	76	60	6	10	7	11	82
66	83	66	6-1/2	10-1/2	7-1/2	11-1/2	89
72	90	72	7	11	8	12	96

NOTES

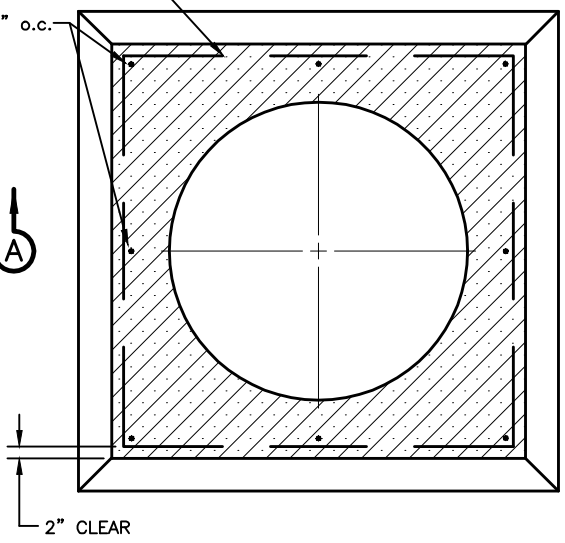
CAST IRON FRAME WITH THREE 1-1/2" HOLES ON THE FRAME.
COVER TO HAVE FOUR 1" HOLES AND CITY OF CERES TO BE SHOWN ON LID.
* FOR POURED-IN-PLACE PIPE, USE #4 BARS @ 18" O.C.

STANDARD MANHOLE OVER PIPE

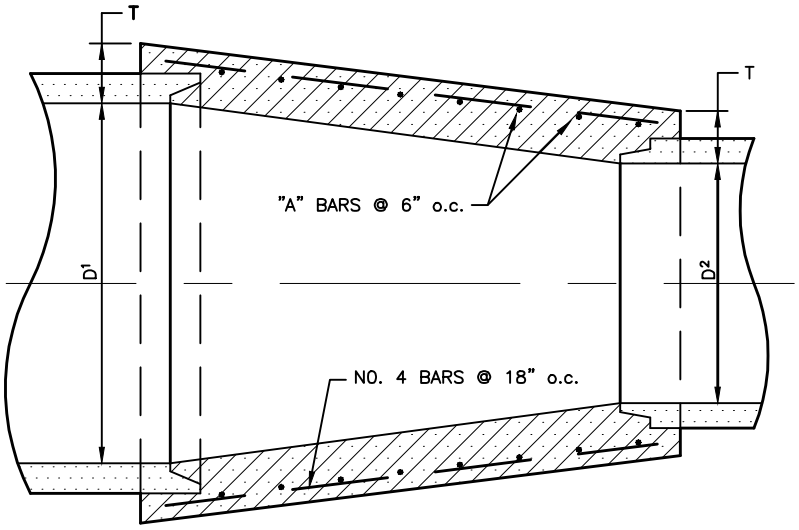
	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: SD-6
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



PLAN



SECTION B-B



SECTION A-A

TABLE OF DIMENSIONS AND BAR SIZES

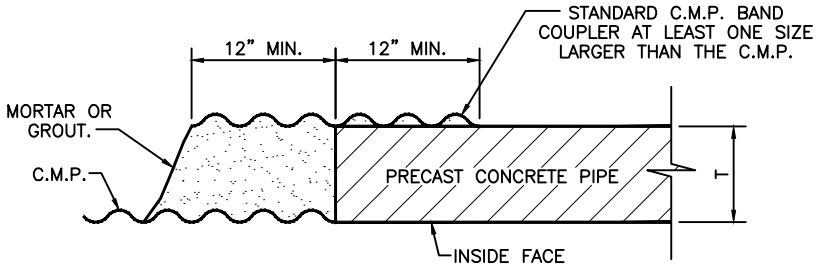
D	T	"A" BARS
18"	4 1/2"	NO. 4 BARS
21"	5"	
24"	5 1/4"	
27"	5 1/2"	
30"	6"	
33"	6 1/4"	
36"	6 1/2"	
39"	7"	
42"	7 1/2"	NO. 5 BARS

NOTES:

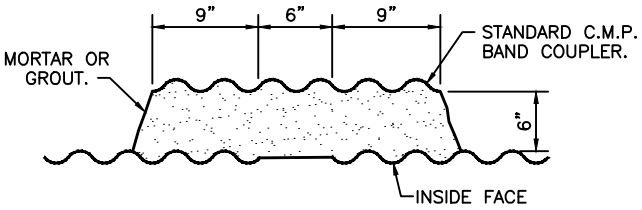
1. DIMENSIONS SHOWN ARE MINIMUM DIMENSIONS. STRUCTURE MAY BE LONGER AT CONTRACTOR'S OPTION USING REINF. BARS AS SHOWN.
2. STRUCTURE MAY BE POURED TO TRENCH WALL AT CONTRACTOR'S OPTION. IF DRAINAGE LEG ENTERS STRUCTURE, POUR TO TRENCH WALL AND ADD NO. 4 HOOPS AS DIRECTED.

STANDARD TRANSITION STRUCTURE

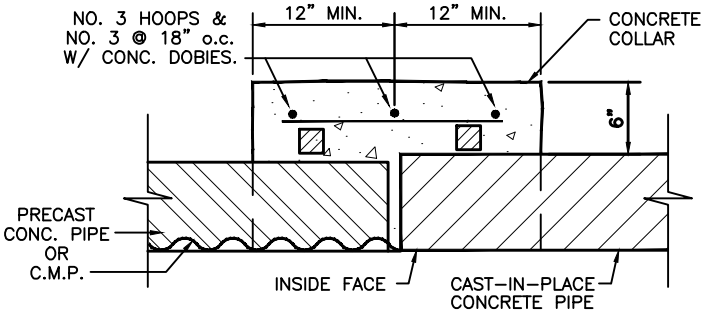
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: SD-7
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



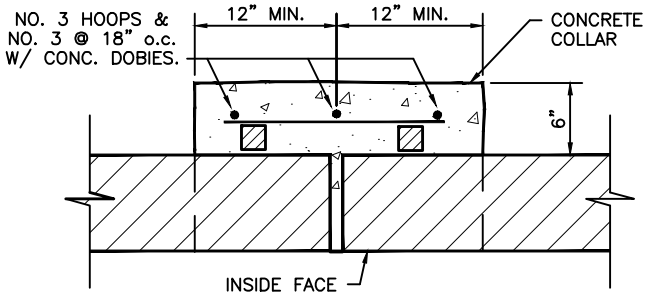
C.M.P. TO PRECAST CONCRETE PIPE



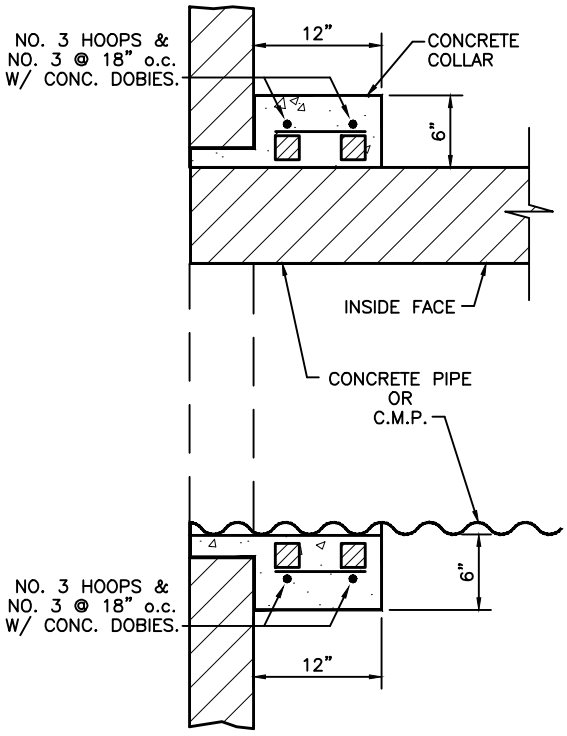
PIPES OF DISSIMILAR MATERIALS



CAST-IN-PLACE CONCRETE TO C.M.P. OR PRECAST CONCRETE PIPE



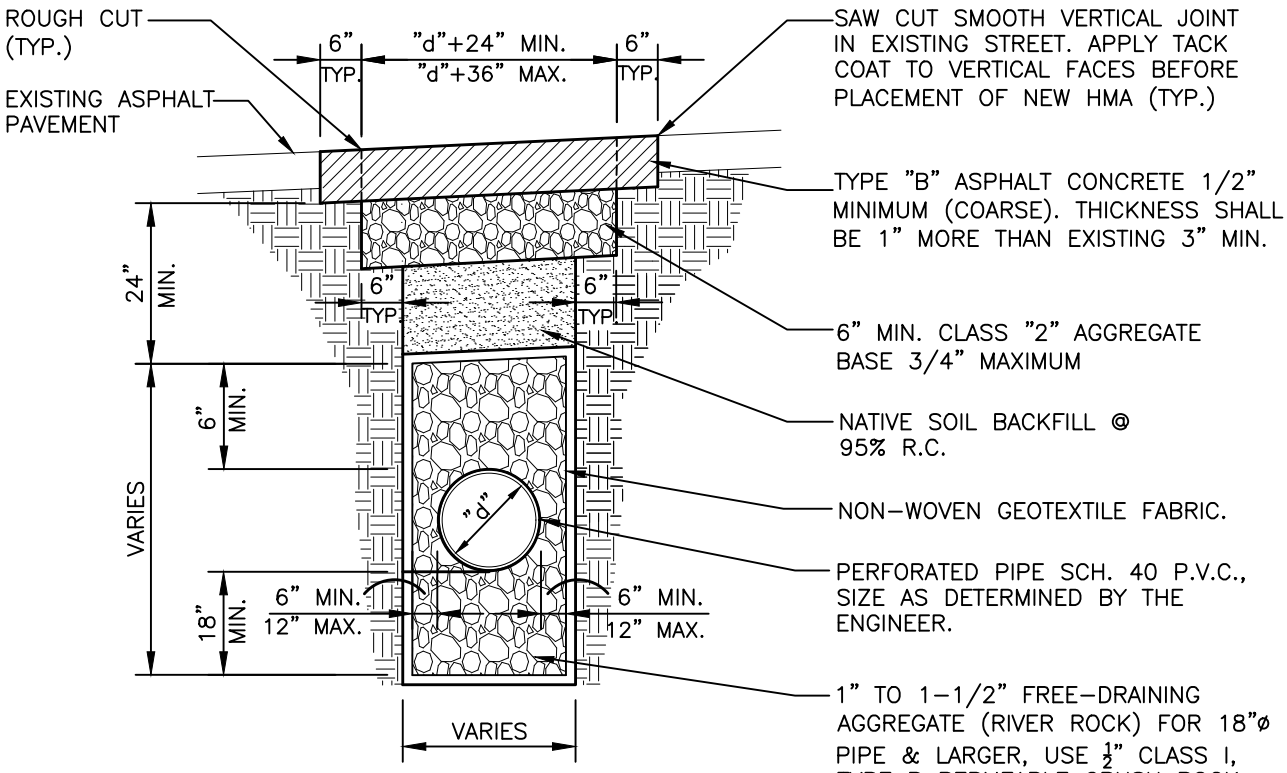
PRECAST CONCRETE PIPE TO PRECAST CONCRETE PIPE WITHOUT STANDARD JOINT



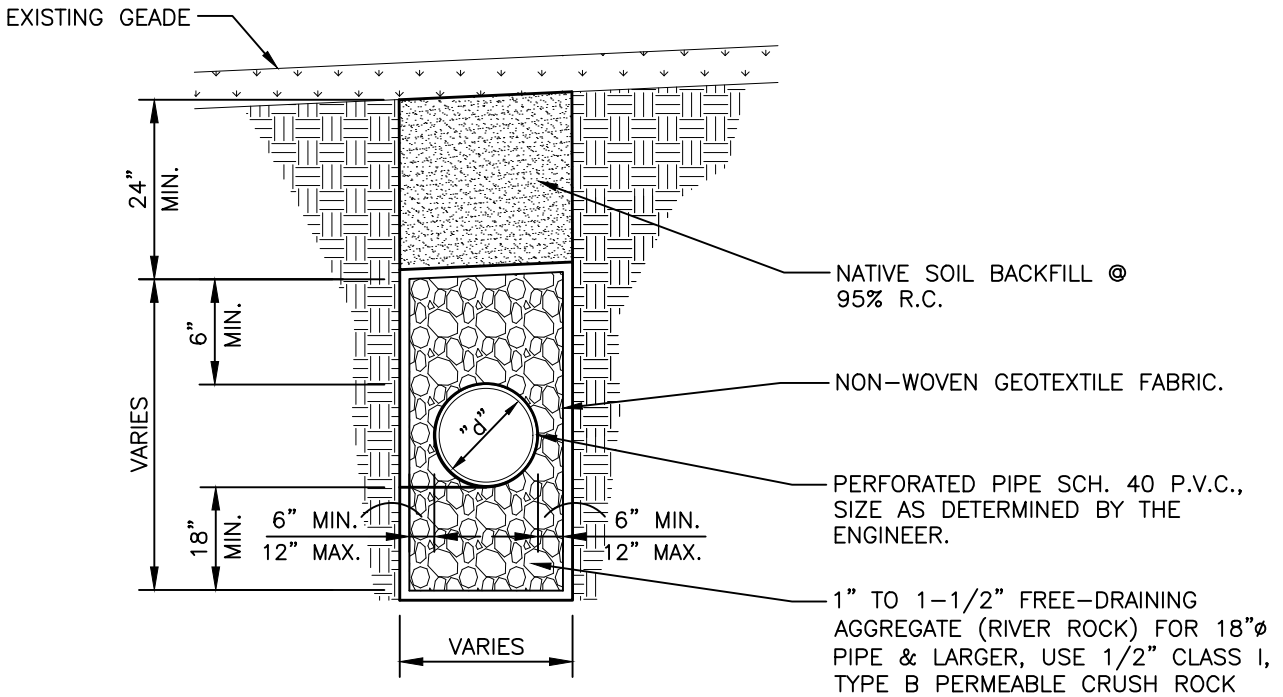
CONCRETE PIPE OR C.M.P. TO EXISTING STRUCTURE

PCC COLLAR CONNECTION

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: SD-8
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



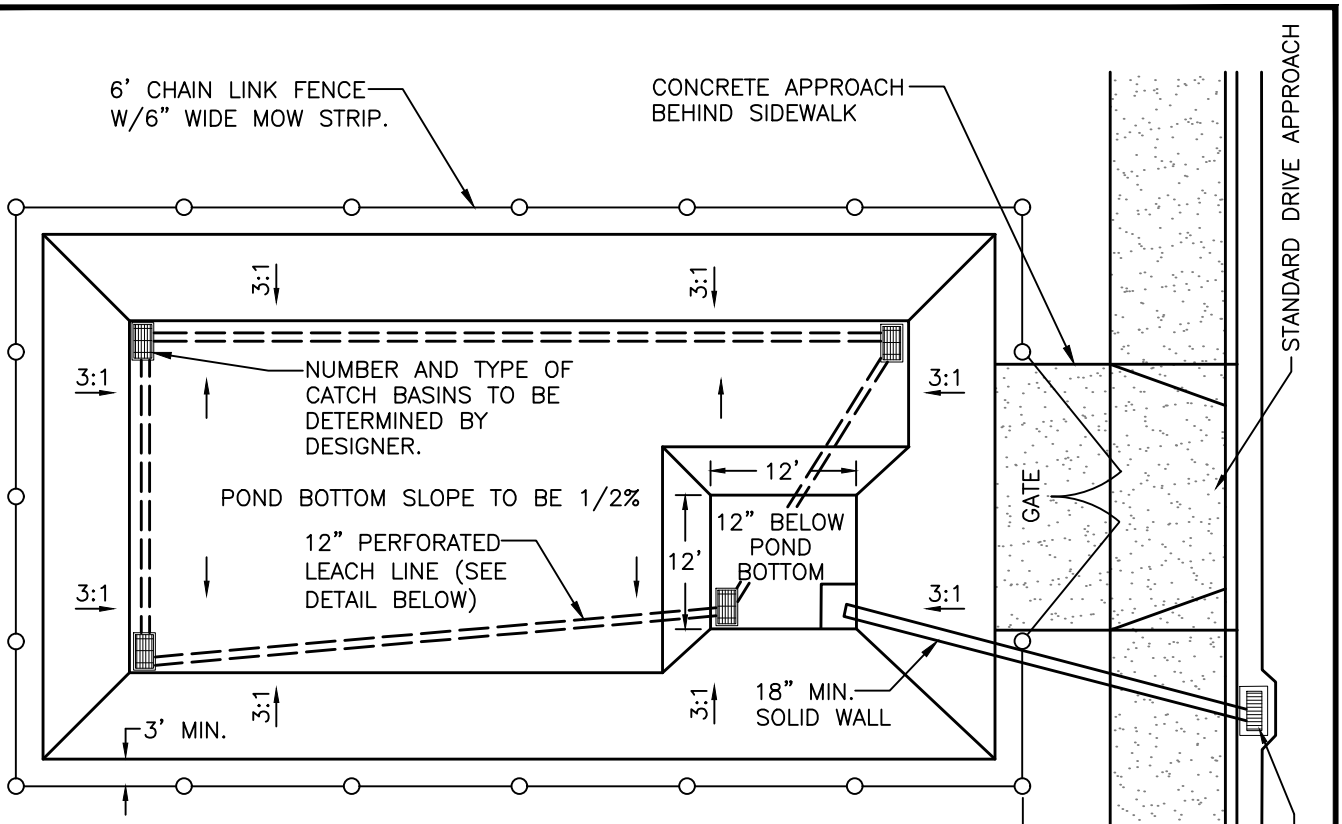
ROADWAY PAVEMENT



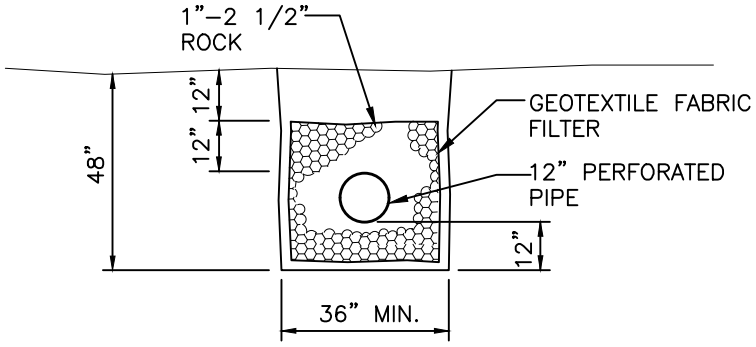
LANDSCAPED AREA

FRENCH DRAIN DETAIL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-9
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



PLAN



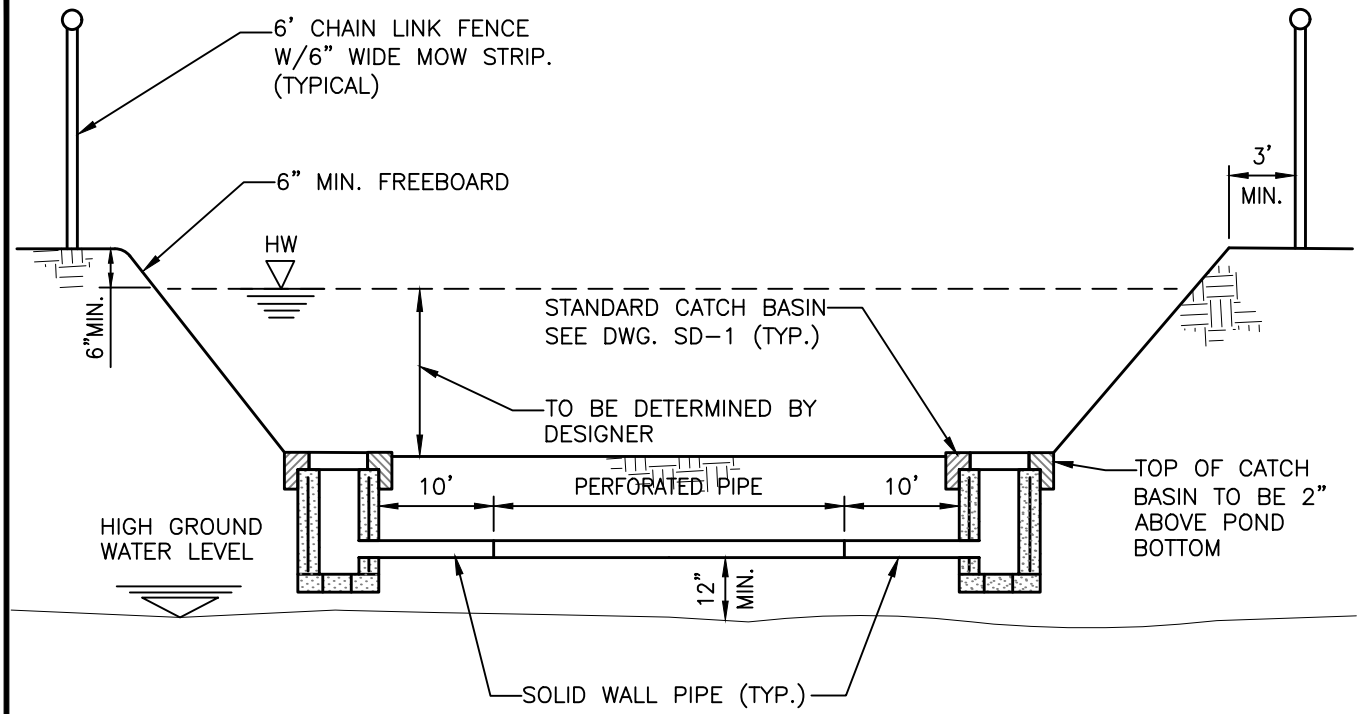
LEACH LINE DETAIL

NOTES:

1. WEED CONTROL TO BE APPLIED TO BANKS PRIOR TO ACCEPTANCE BY THE CITY.
2. DESIGNER SHALL SUBMIT SOIL LOG AND OTHER PERTINENT DESIGN DATA FOR APPROVAL BY THE CITY.
3. DESIGNS AS SHOWN ARE CONCEPTUAL. ALTERNATE DESIGNS OR MODIFICATIONS TO THE STANDARD SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL WHEN DEPTH TO GROUND WATER IS LESS THAN 8 FEET AND / OR OTHER FACTORS LIMIT THE IMPLEMENTATION OF THE STANDARD DESIGN.

STANDARD DRAINAGE BASIN

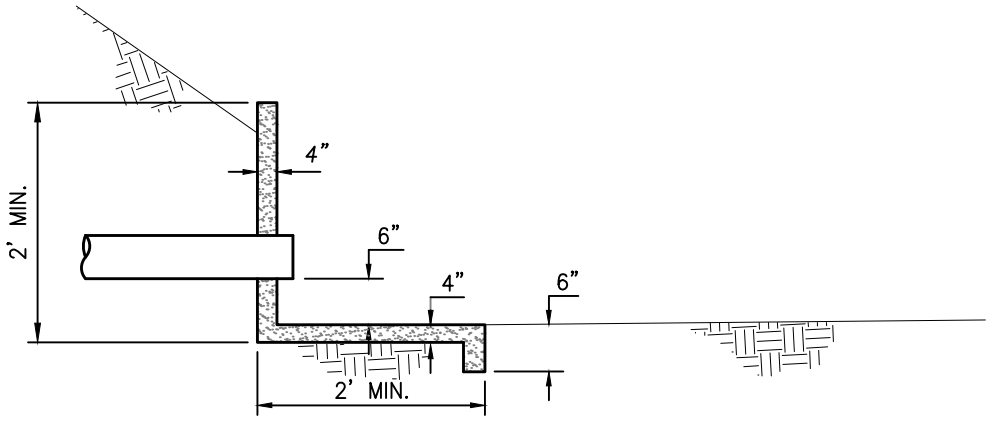
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD–10A
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



BASIN CROSS-SECTION

NOTE:

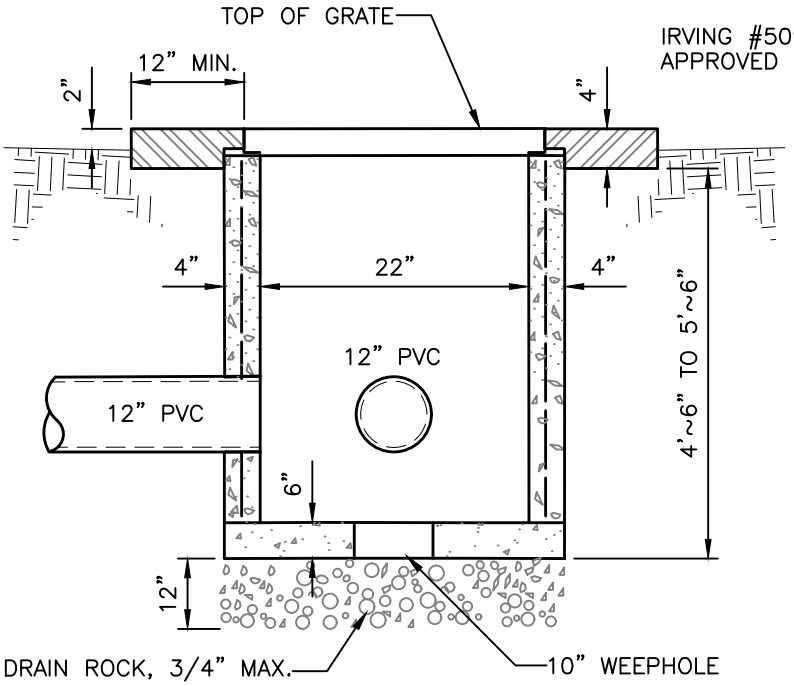
HW: DESIGN HIGH WATER SHALL BE EQUAL TO ONE FOOT BELOW LOWEST TOP OF CURB (TC) OF CONNECTED CATCH BASIN.



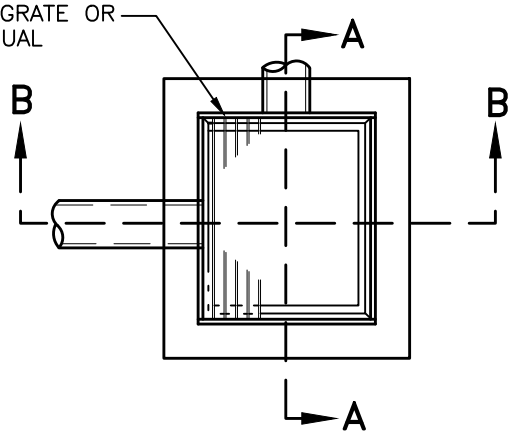
OUTLET DETAIL

DRAINAGE BASIN DETAILS

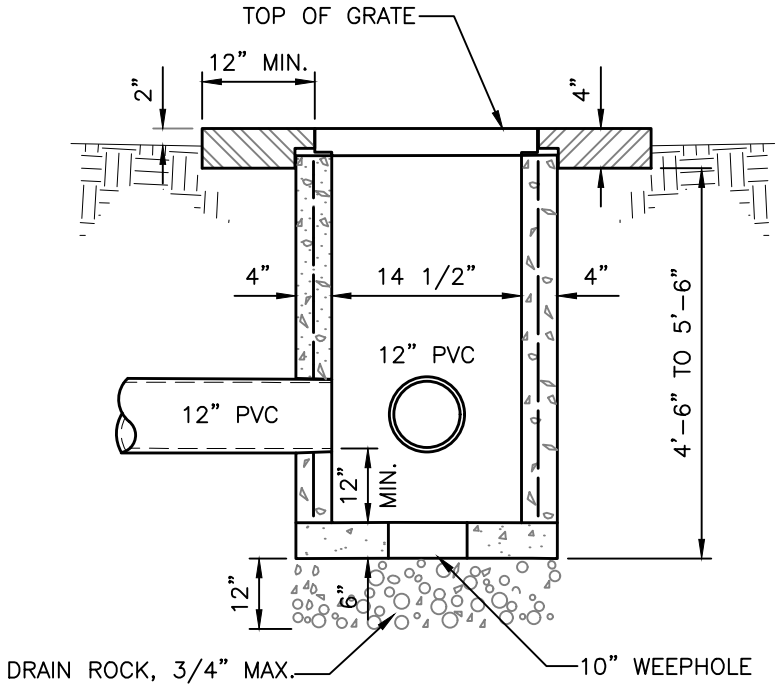
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-10B
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



SECTION A–A



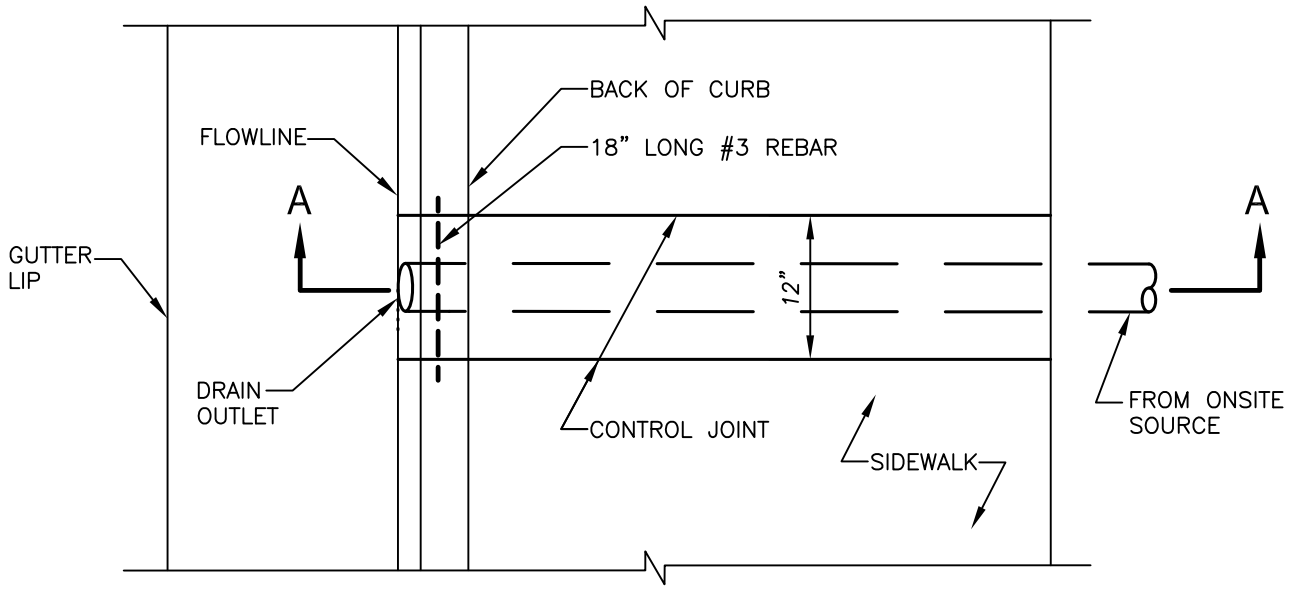
PLAN VIEW



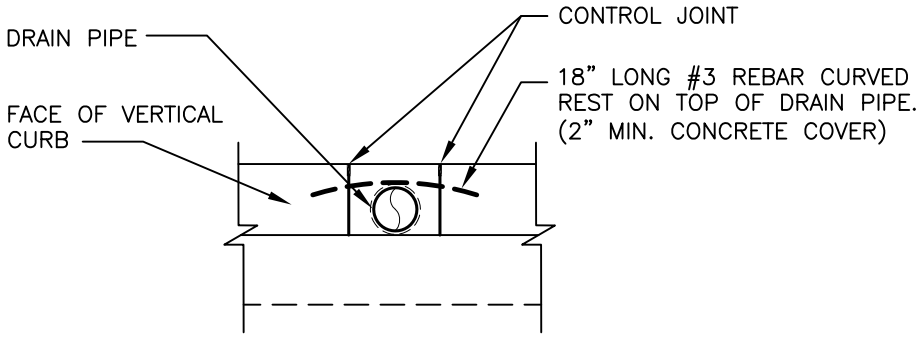
SECTION B–B

CATCH BASIN DETAILS

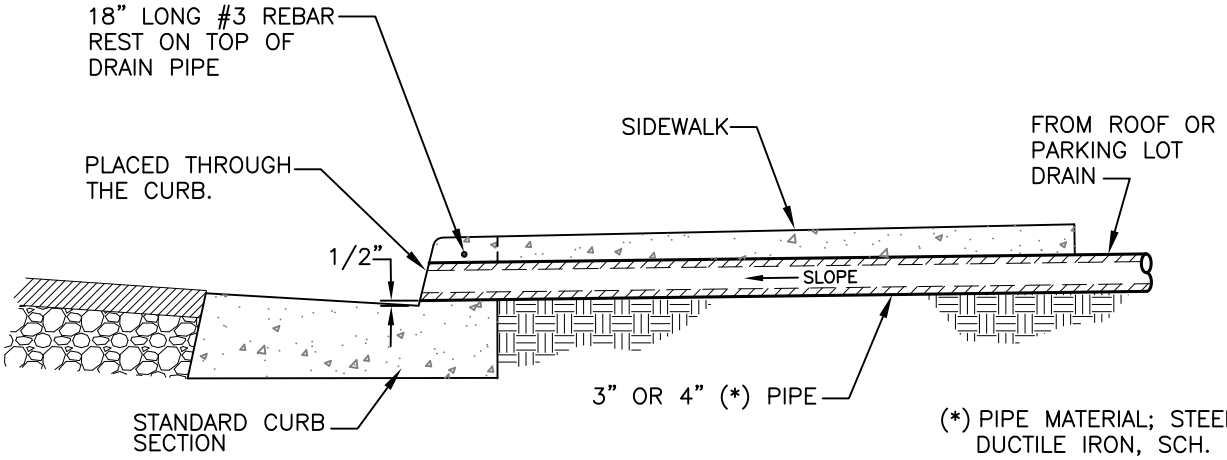
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-10C
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



PLAN



PROFILE



SECTION A–A

CURB DRAIN UNDER SIDEWALK

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD–11
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

STORM DRAINAGE STANDARD DESIGN

The design criteria and guidelines set forth herein shall be followed in accordance with accepted engineering principles, and shall conform to these minimum design standards of the City of Ceres.

Residential, commercial and industrial developments shall have surface drainage disposal accommodated in one or more of the following prioritized ways:

a. On-Site Drainage - New development projects (residential, commercial, and industrial properties) and re-development projects shall contain all storm drainage on-site unless the methods listed below are available and approved for use prior to submittal of the drainage plan.

b. Positive Drainage - Positive drainage is a gravity flow storm drainage collection and discharge system into a river, stream, creek, irrigation facility, municipal storm drain system, or other waterway.

c. Off-Site Retention/Detention Facility - Drainage retention and/or detention facilities shall be used when positive drainage is not available. Adequate capacity in the off-site drainage facilities must be available.

The following table shall be used in designing storm drainage facilities:

Design Area	Design Method	Design Return	Design Section/Comments
Retention Basins	V = CAR/12	Storage Requirements for a 100-Year, 24-hour design storm. R = 2.88" Note: Drainage facilities shall be sized to empty the design volume of a 100-year, 24-hour storm within 48 hours.	Retention Basins shall be designed to store the entire volume of a 100-year frequency, 24-hour duration storm (R=2.88") and shall be capable of infiltrating without any pumping within 48 hours. Provide rock well at the lowest elevation to avoid ponding water.

STORM DRAINAGE STANDARD DESIGN

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-12A
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

Detention Basins	V = CAR/12	Storage Requirements for a 100-Year, 24-hour design storm. R = 2.88" Note: Drainage facilities shall be sized to empty the design volume of a 100-year, 24-hour storm within 48 hours.	Detention Basins shall be large enough to hold a 100-year, 24-hour frequency storm. The maximum depth of basin shall be 10 feet and basin bottom floor elevation shall be at least 10 feet above the existing water table. Water level shall be 3 feet free board.
Horizontal Drains (Fench Drains)	V = CAR/12	Storage Requirements for a 100-Year, 24-hour design storm. R = 2.88" Note: Drainage facilities shall be sized to empty the design volume of a 100-year, 24-hour storm within 48 hours.	Horizontal Drains shall be designed to store the 50-year storm underground on-site with remaining 100-year volume above ground, 24-hour frequency storm.
< 200 acres	Rational Formula Q = CIA	10-year, 24-hour for pipeline/conveyance R = 1.88"	The peak flow rate shall be used to size pipes and culverts and shall be determined using the following rational formula: **Q = CIA**
> 200 acres	Rational Formula Q = CIA	10-year, 24-hour for pipeline/conveyance R = 1.88"	The peak flow rate shall be used to size pipes and culverts and shall be determined using the following rational formula: **Q = CIA**
Pipelines	Manning's Equation	10-Year, 24-hour for pipeline/conveyance R = 1.88"	The Manning equation shall be used to determine the capacity and friction losses of open channels and enclosed gravity conduits: **$Q = VA = 1.486/n\ R^{2/3} S^{1/2} A$** The 10-year, 24-hour design storm used to design the conveyance drainage facilities shall not surcharge any conduit unless written approval is granted by the City Engineer.

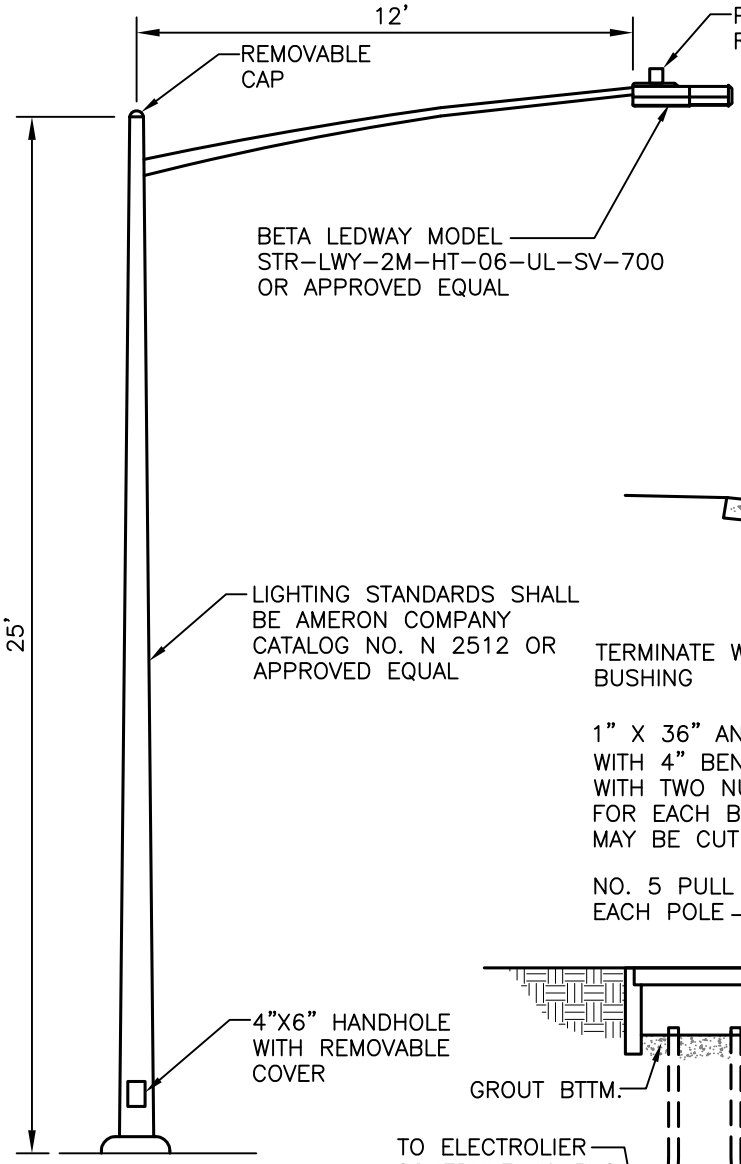
NOTE: Any alternates must be approved by the City Engineer.

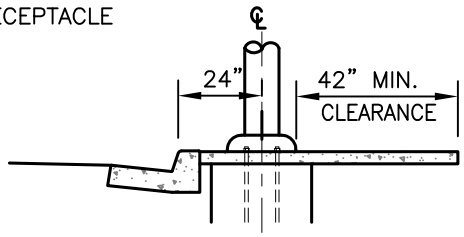
STORM DRAINAGE STANDARD DESIGN

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: SD-12B
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

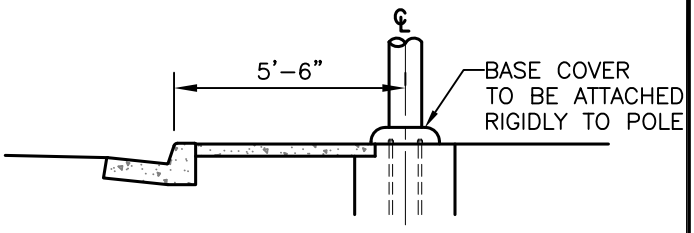
CITY OF CERES
STANDARD DESIGNS

STREET LIGHTING

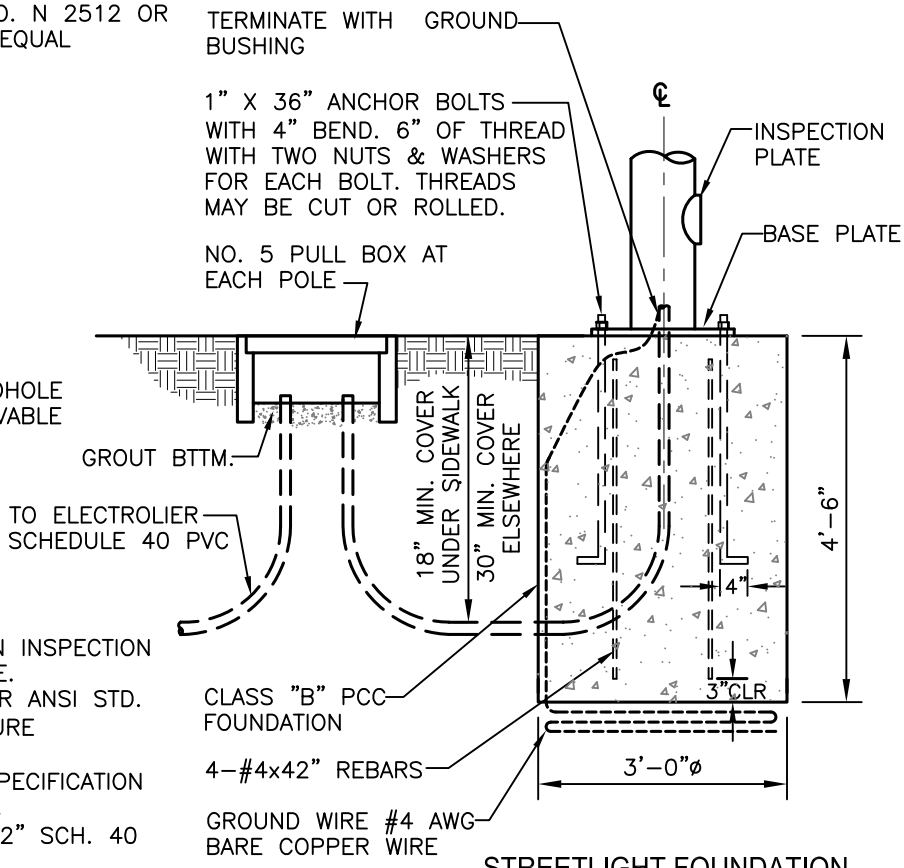




COMMERCIAL



RESIDENTIAL



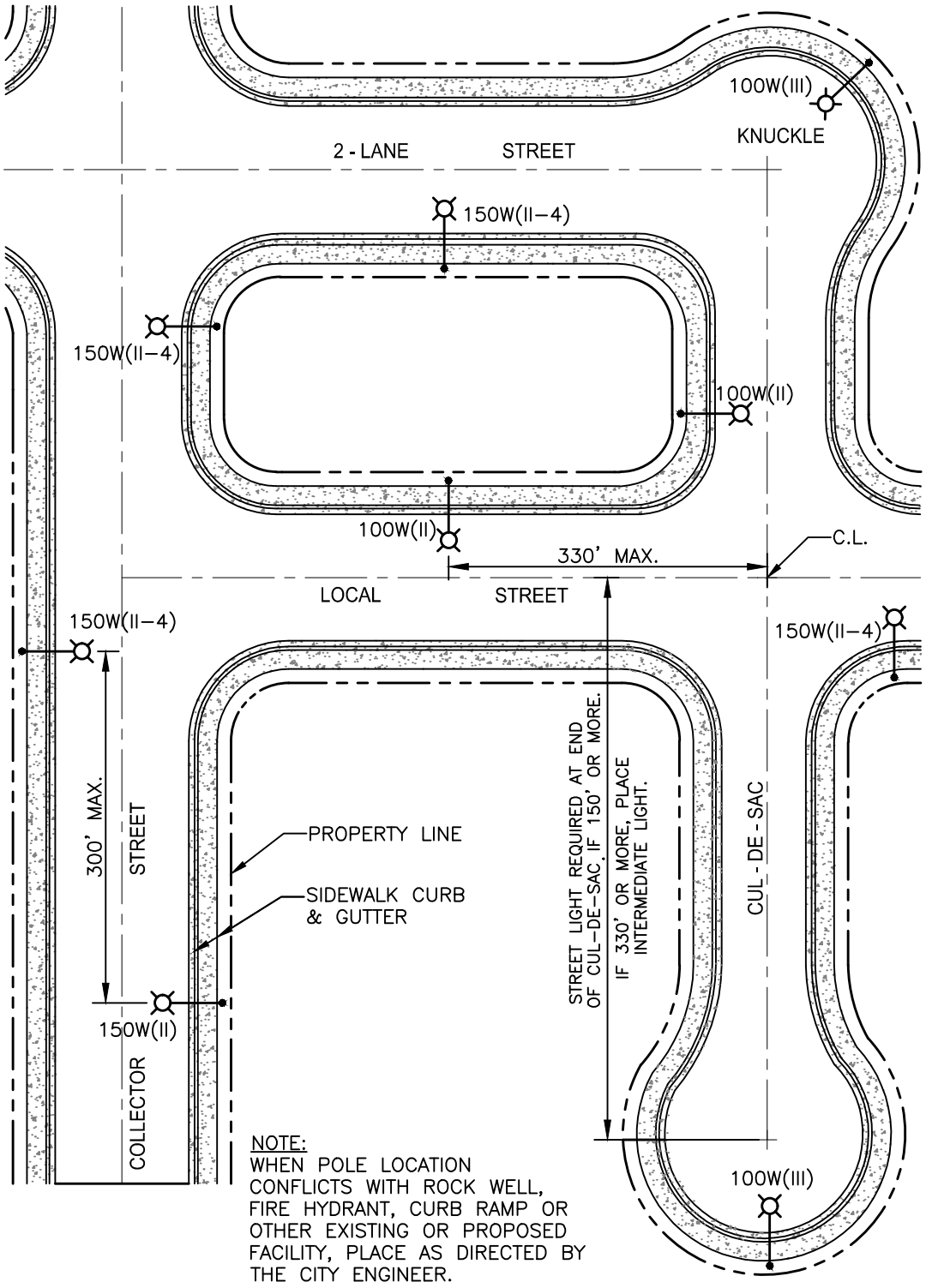
STREETLIGHT FOUNDATION

GENERAL NOTES

1. INSTALL FUSE BOX ON WIRES IN INSPECTION BOX AT THE BASE OF THE POLE.
2. FOR LEDS WATTAGE STICKER PER ANSI STD. C136.15 (IDENTIFYING THE FIXTURE TECHNOLOGY).
3. FOR LUMINAIRE SEE PROJECT SPECIFICATION OR ENGINEER APPROVED EQUAL.
4. CONDUITS SHALL BE MIN. 1-1/2" SCH. 40 PVC.
5. CONDUCTORS FOR 120V. LIGHTING SHALL BE MIN. #10 THWN STRANDED COPPER.

STANDARD STREETLIGHT

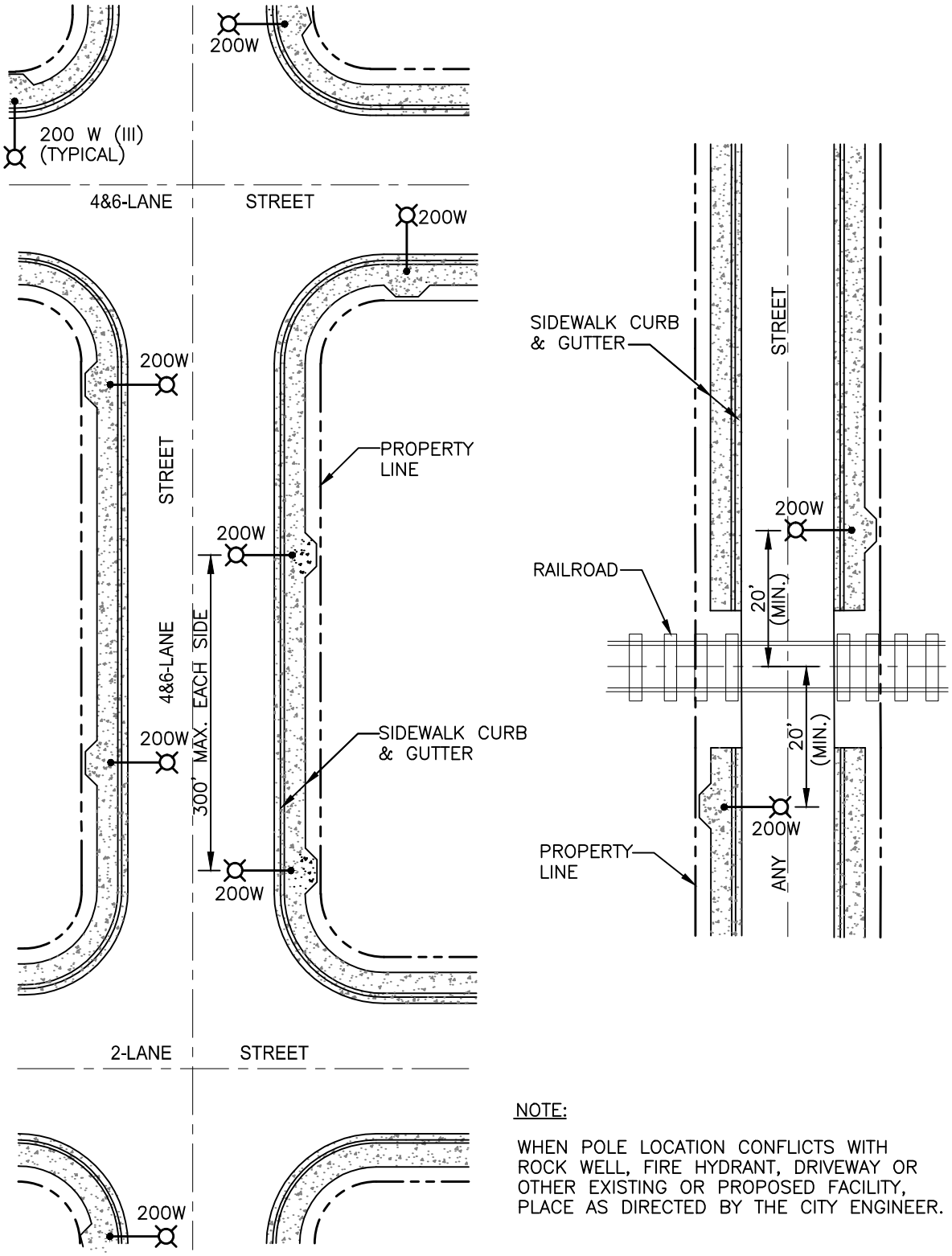
	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: L-1
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



NOTE:
WHEN POLE LOCATION CONFLICTS WITH ROCK WELL, FIRE HYDRANT, CURB RAMP OR OTHER EXISTING OR PROPOSED FACILITY, PLACE AS DIRECTED BY THE CITY ENGINEER.

STREETLIGHT LOCATION

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: L–2A
CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

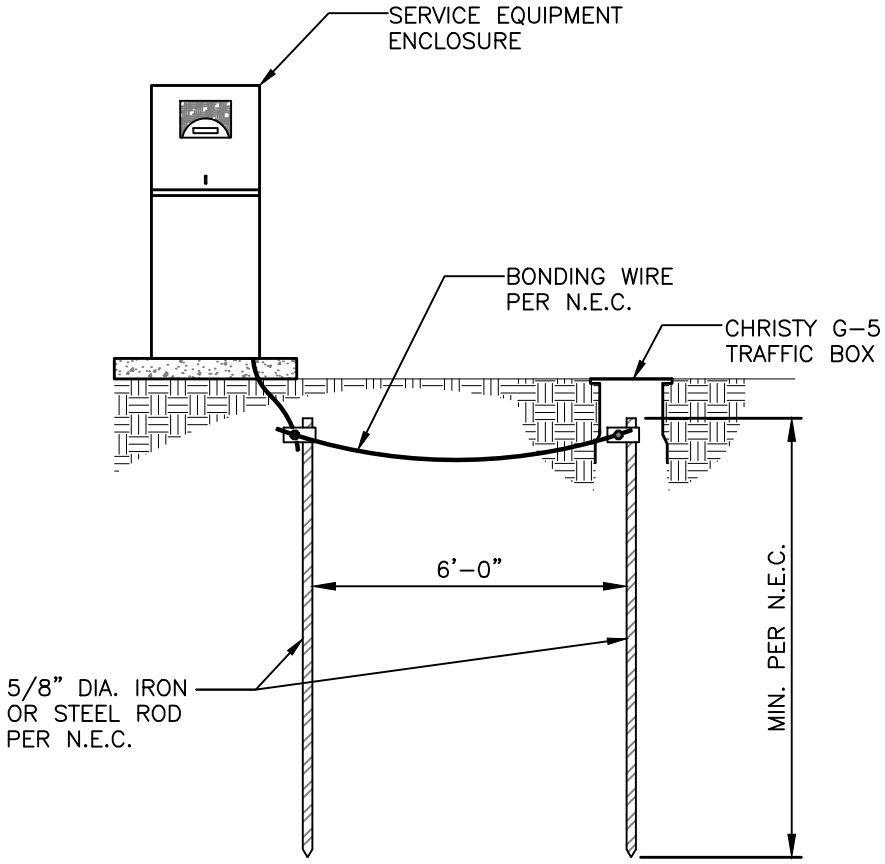


NOTE:

WHEN POLE LOCATION CONFLICTS WITH ROCK WELL, FIRE HYDRANT, DRIVEWAY OR OTHER EXISTING OR PROPOSED FACILITY, PLACE AS DIRECTED BY THE CITY ENGINEER.

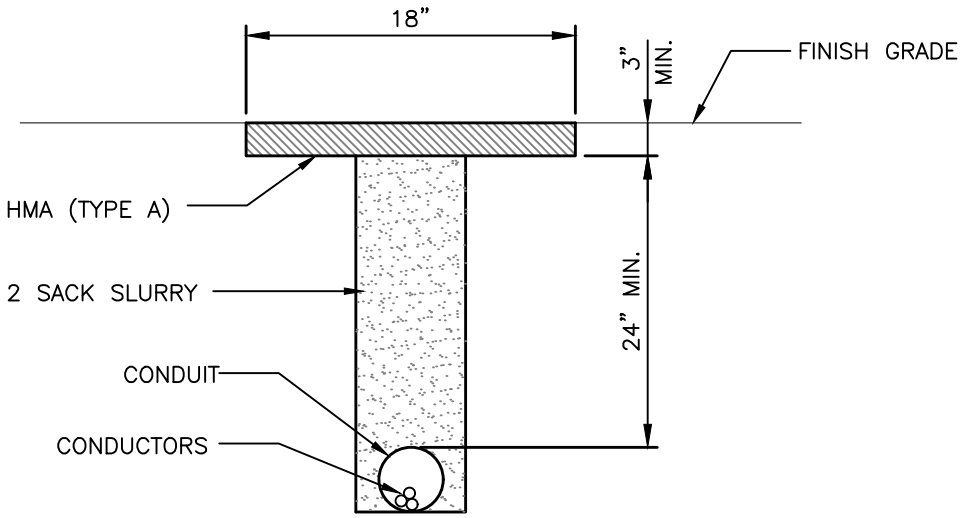
STREETLIGHT LOCATION

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: L-2B
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



GROUNDING ELECTRODE SYSTEM

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: L-3 COUNCIL APPROVAL DATE DATE 03/26/2018



CONDUIT TRENCH DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: L–4 COUNCIL APPROVAL DATE DATE 03/26/2018

NOTES:

1. CONTACT T.I.D. PRIOR TO ENTERING UNDERGROUND SERVICE BOX OR PRIOR TO ATTACHING ANY MATERIAL TO T.I.D. POLES.

2. T.I.D. WILL COMPLETE CONNECTION OF 120V CIRCUIT UPON RECEIPT OF SIGNED APPLICATION FOR SERVICE FROM THE CITY OF CERES.

3. MINIMUM CONDUIT COVER: 24" BELOW CURB GRADE WITHIN THE PUBLIC RIGHT-OF-WAY. 30" BELOW FINISH PROPERTY ELEVATION WITHIN PUBLIC UTILITY EASEMENT.

4. MAINTAIN 36" CLEARANCE IN FRONT OF INSPECTION PLATE.

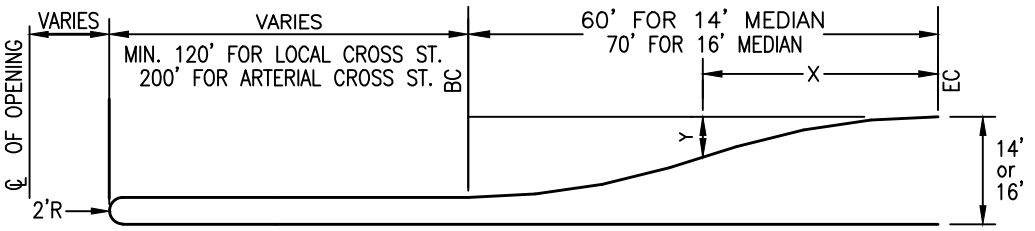
5. WHEN POLE LOCATIONS CONFLICT WITH A FIRE HYDRANT, CURB RAMP OR OTHER EXISTING OR PROPOSED FACILITY, PLACE AS DIRECTED BY THE CITY ENGINEER.

STREETLIGHT NOTES

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: L-5
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

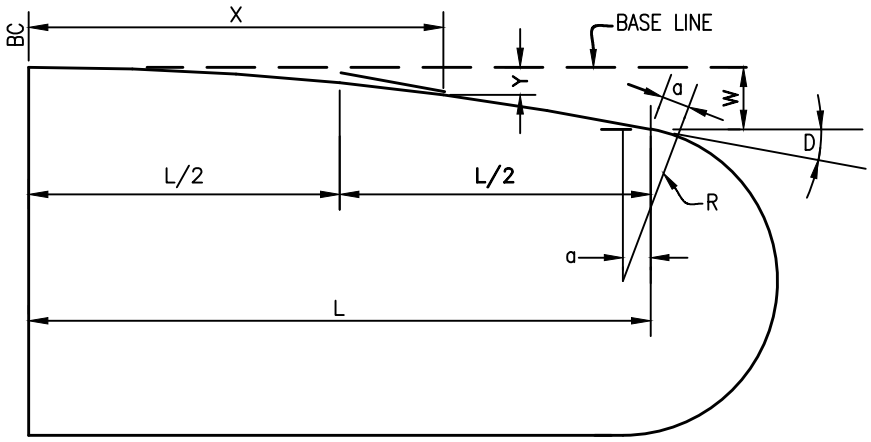
TRAFFIC



LEFT TURN POCKET

Distance X at	Offset Distance Y	
	14' Median	16' Median
10'	0.55'	0.49'
20'	2.22'	1.96'
30'	5.00'	4.41'
40'	7.78'	7.59'
50'	9.44'	10.04'
60'	10.00'	11.51'
70'	--	12.00'

L = LENGTH OF FLARE, IN FEET.
W = MAXIMUM OFFSET DISTANCE, IN FEET.
X = DISTANCE ALONG BASE LINE, IN FEET.
A = TANGENT
R = RADIUS OF NOSE, IN FEET.
Y = OFFSET FROM BASE LINE, IN FEET.



MEDIAN FLARE OPENING

Offset "Y" (in feet) for W/L = 1:10

L \ X	10	20	30	40	50	60
60	0.17	0.67	1.50	2.67	4.17	6.00

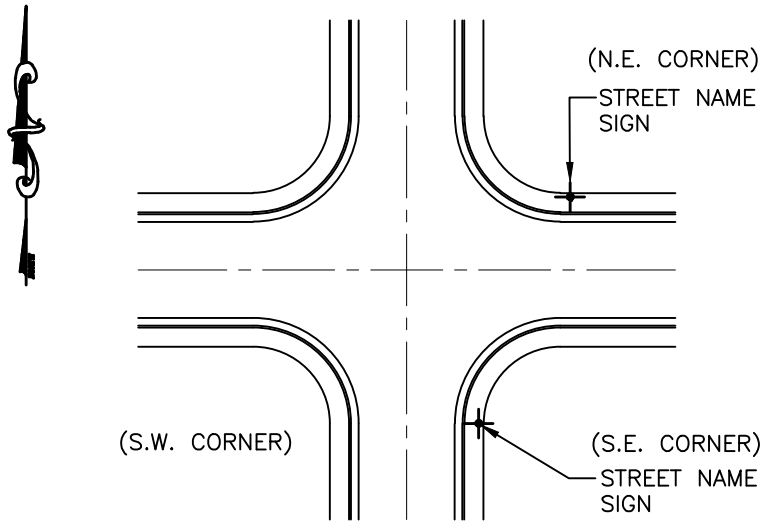
$$Y = W\left(\frac{X}{L}\right)^2 \qquad \text{Tan. } D = \frac{2W}{L} \qquad a = R \text{ Tan. } \frac{D}{2}$$

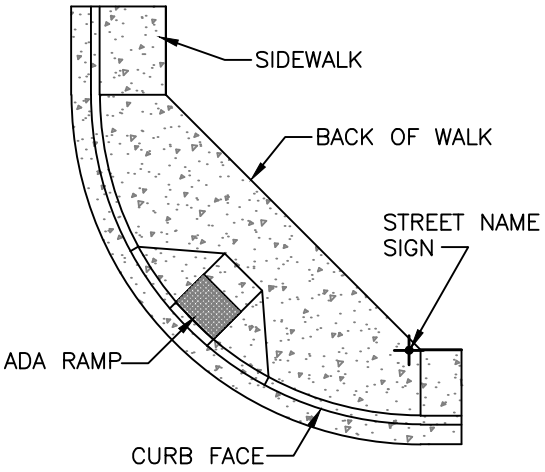
NOTES

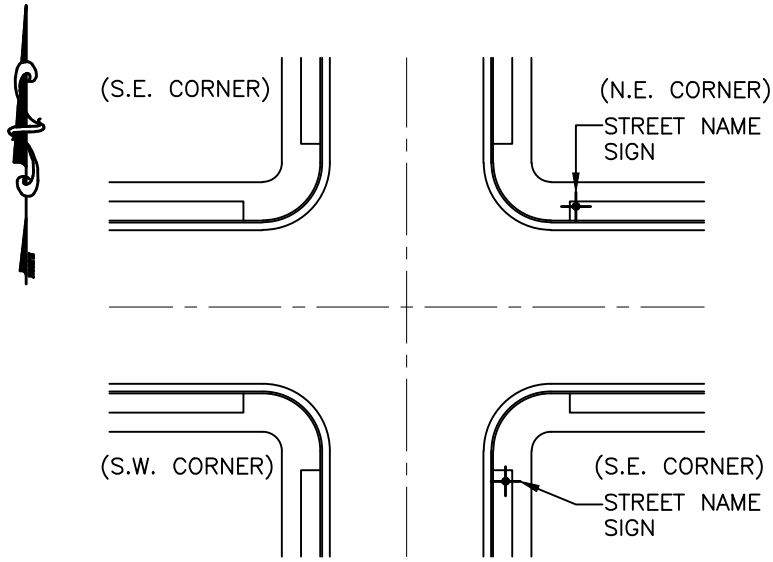
1. FOR 60' FLARE USE R = 4' (14' MEDIAN).
2. IF STATION OF RADIUS POINT IS NOT GIVEN ON PLAN, TANGENT "A" MAY BE IGNORED.

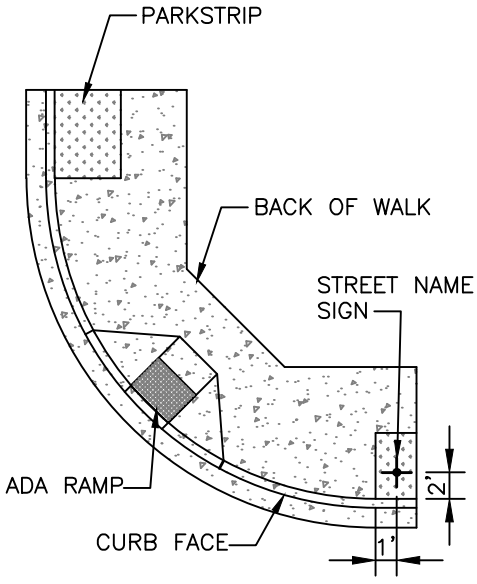
LEFT TURN POCKET & MEDIAN OPENING

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: TC-1
	CHECKED BY: NAME	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018







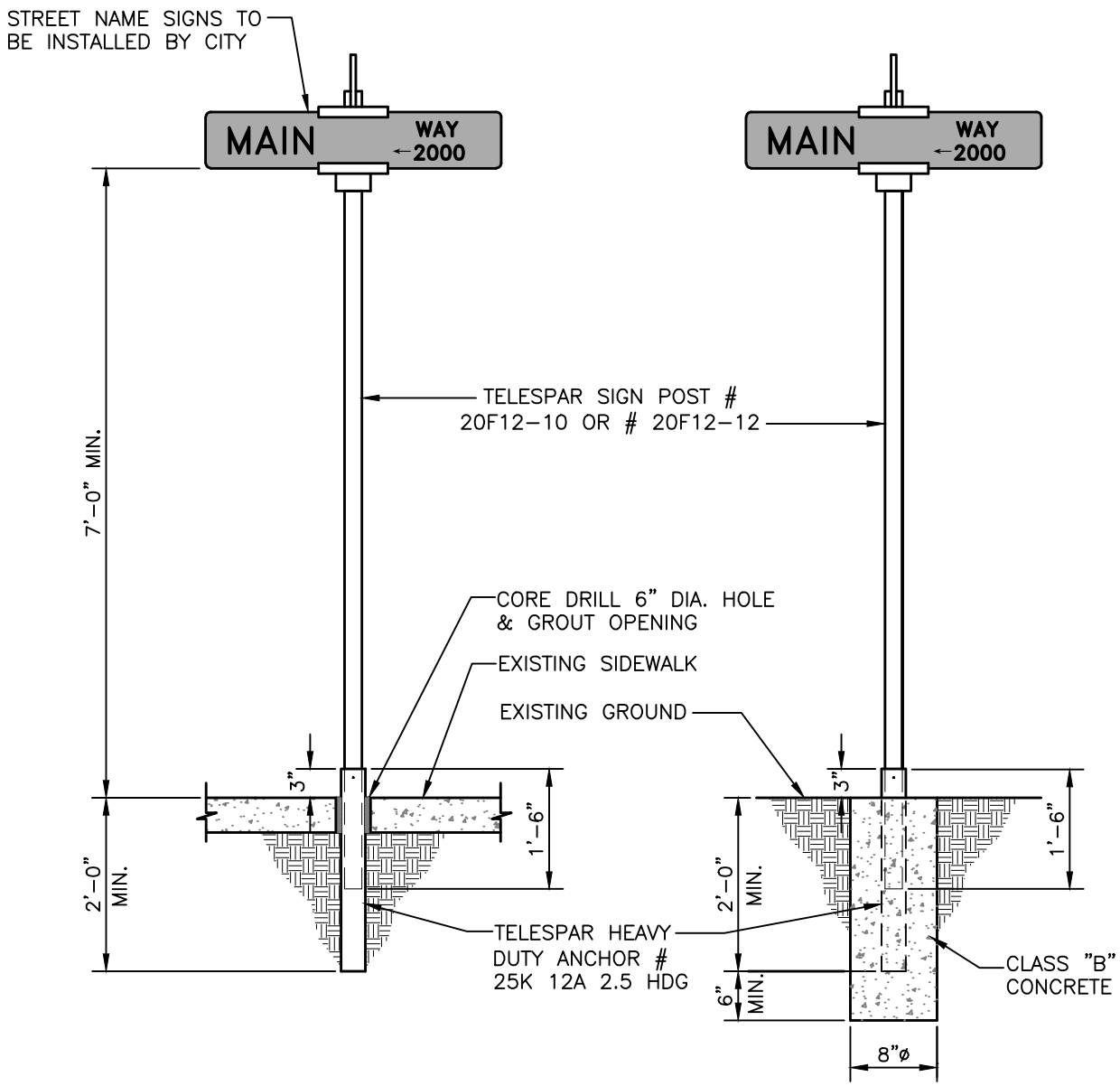


NOTES:

1. DRILL 3" DIA. HOLE IN CONCRETE IF SIGN INSTALLED AFTER SIDEWALK HAS BEEN CONSTRUCTED.
2. SIGN LOCATION SHALL BE AS FOLLOWS:
   ON RESIDENTIAL STREETS: N.E. OR S.E. CORNER;
   ON MAJOR ARTERIALS: ON BOTH SIDES OF THE STREET.

STREET SIGN LOCATION

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: TC-2
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



IN EXISTING SIDEWALK AREA

IN PLANTER AREA

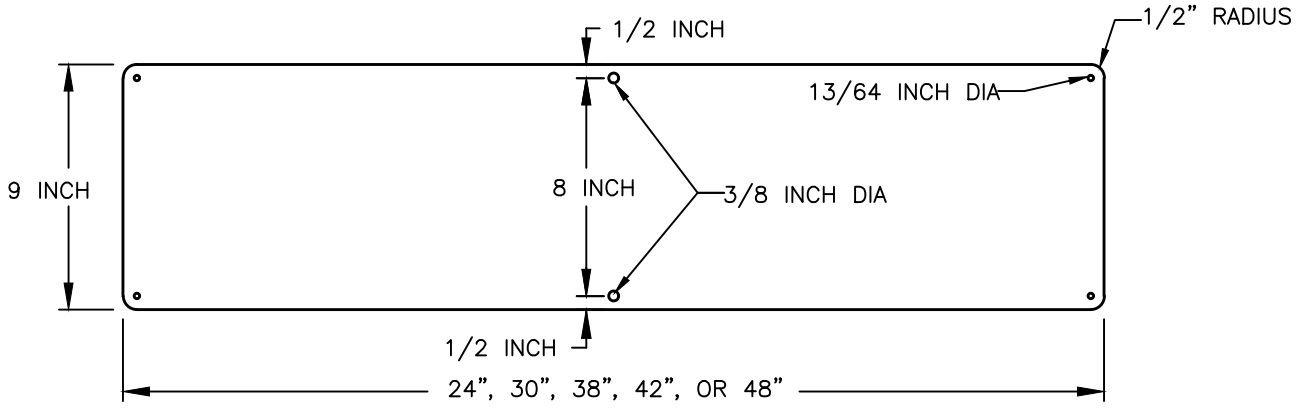
NOTES:

1. SEE STANDARDS DETAIL TC-2 FOR LOCATION OF STREET NAME SIGNS.
2. ANCHOR TO BE DRIVEN OR PLACED WITH 3" MAXIMUM ABOVE GROUND LEVEL.

STREET SIGN INSTALLATION

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: TC-3 COUNCIL APPROVAL DATE DATE 03/26/2018

ALUMINUM SIGN BLANK

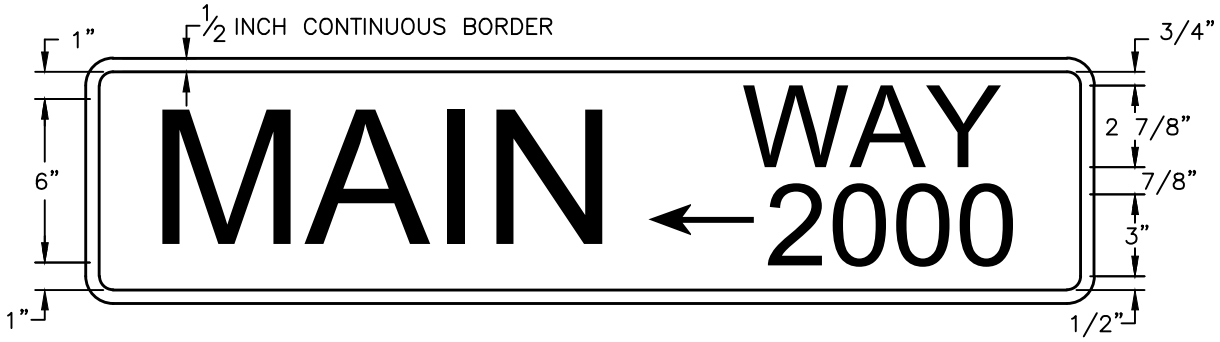


1. ALL BLANKS TO BE 0.08 GAUGE ALUMINUM ALLOY (6D61–TB OR 5155–H38). DEGREASED AND TREATED WITH ALODINE 1200.

2. THE SIGN BLANKS SHALL CONFORM TO THE STANDARD B.P.R. SHAPES AND CORNER RADII, EXCEPT THAT HOLE PUNCHING, OR DRILLING, SHALL CONFORM TO THE HOLE SIZES AND LOCATION SHOWN HEREON. EACH CORNER SHALL HAVE A $^{13}/_{64}$ INCH DIAMETER HOLE.

3. ALL BLANKS SHALL BE 9" HIGH BY 24", 30", 38", 42", OR 48" WIDE. THE HOLES SHALL BE CENTERED ON THE VERTICAL CENTERLINE OF EACH BLANK.

NAME FACE



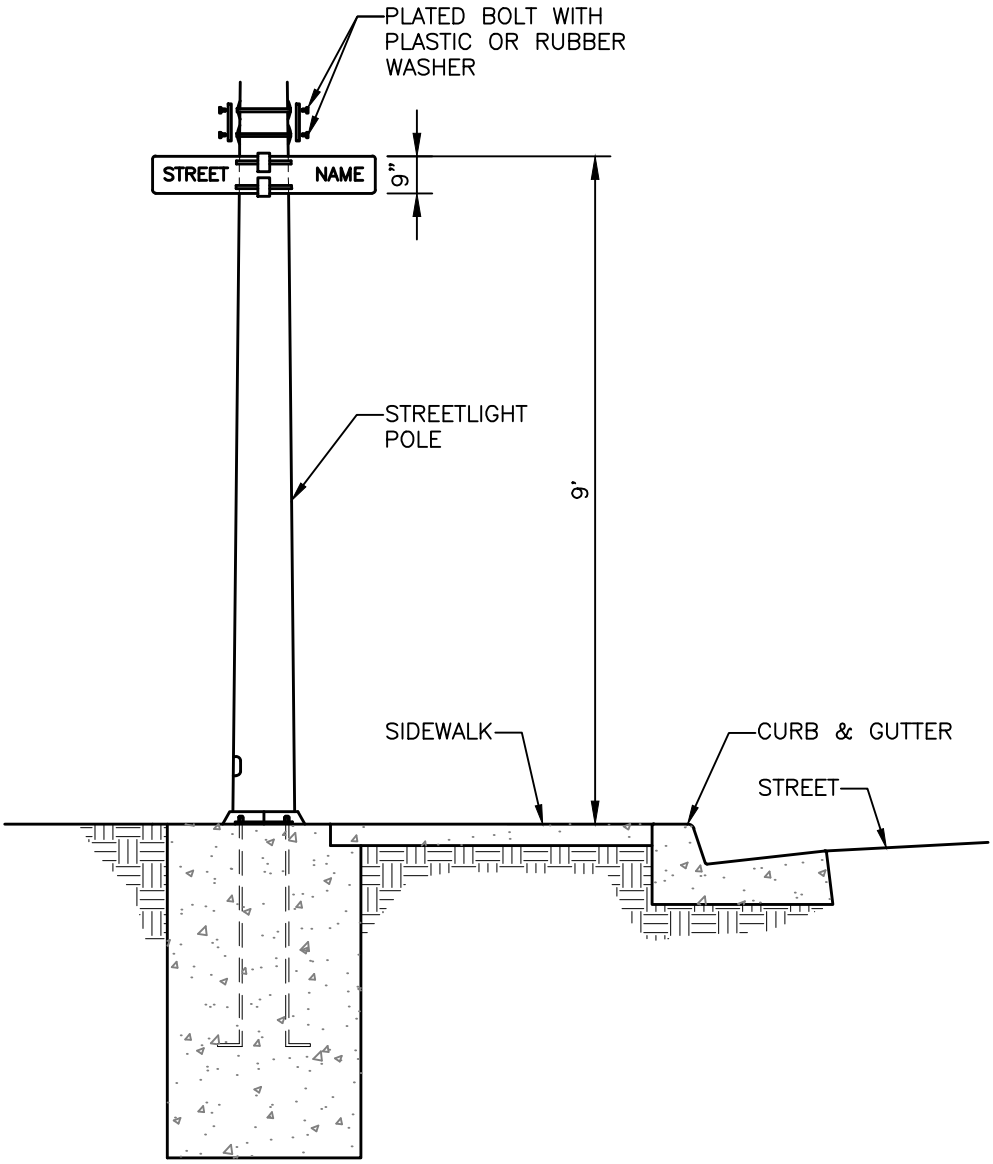
1. EACH SIGN SHALL HAVE SUFFICIENT SPACING PROVIDED TO PERMIT APPLICATION OF A 4–DIGIT NUMBER AND ARROW.

2. NUMERICAL STREET NAMES SHALL BE SPELLED OUT INSTEAD OF USING THE NUMERAL LETTER TYPE ABBREVIATED LEGENDS.

3. ALL SIGN FACES TO BE "SCOTCHLITE" HIGH INTENSITY BRAND REFLECTIVE SHEETING OR BETTER QUALITY, WITH REFLECTIVE SILVER COPY ON REFLECTIVE GREEN BACKGROUND.

STREET SIGN DETAILS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: TC–4 COUNCIL APPROVAL DATE DATE 03/26/2018



GENERAL NOTES

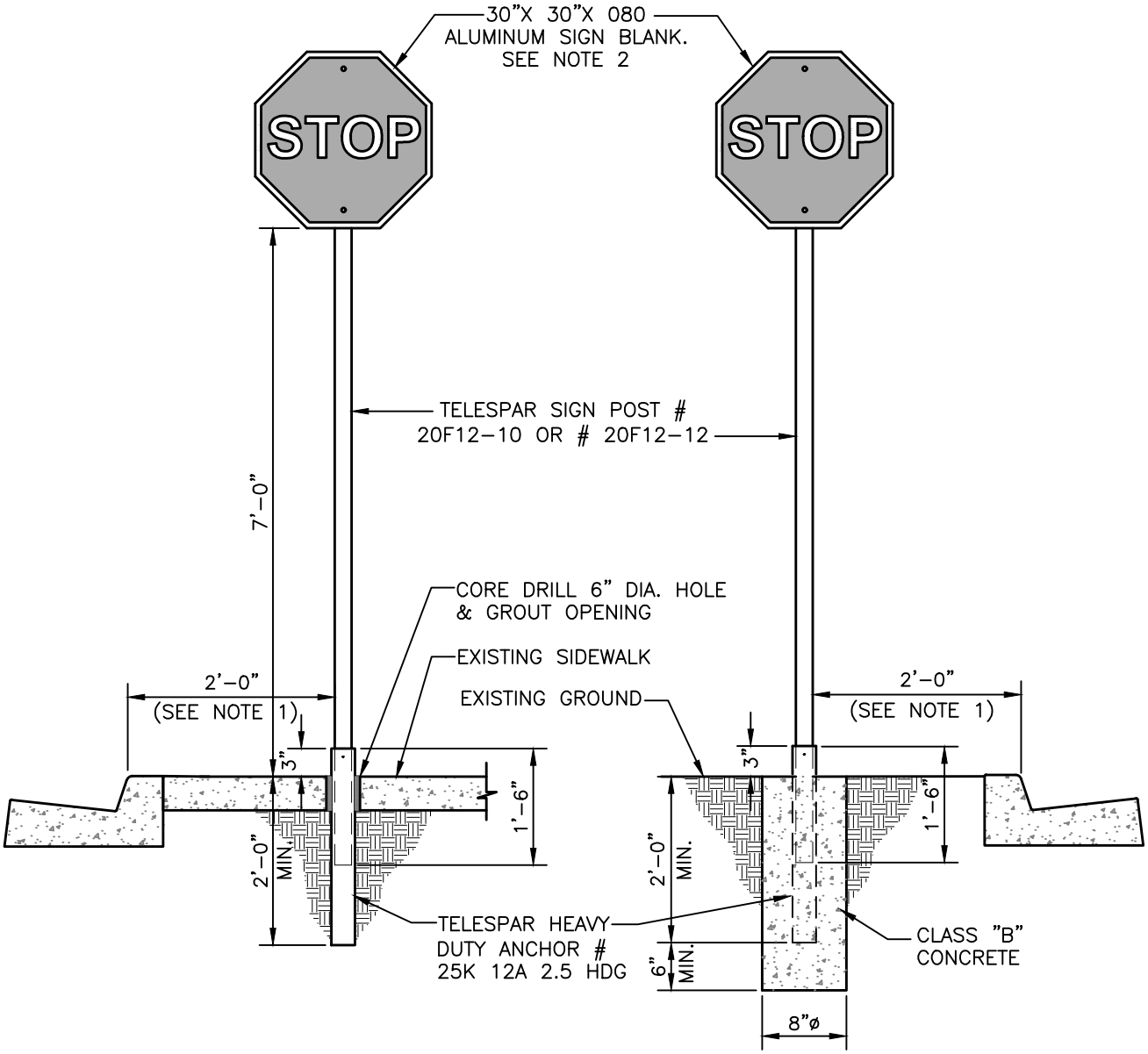
HAWKINS–HAWKINS PARTS LIST

THE FOLLOWING LIST IS OF THE ITEMS FOR EACH UNIT. THE DESCRIPTION AND PART NUMBER ARE FROM HAWKINS–HAWKINS CO. BERKLEY, CALIFORNIA, BUT MAY BE SUBSTITUTED BY ITEMS OF EQUAL QUALITY.

PART NO.	QUANTITY	DESCRIPTION
	2 PER SET OF BLANKS	MIN 030 5/8" STAINLESS STEEL BANDING
M2G–FOB	2 PER BLANK	FLAIR LEG PLATED BRACKETS WITH BOLT AND WASHER

STREET SIGN ON STREETLIGHT POLE

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: TC–5
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



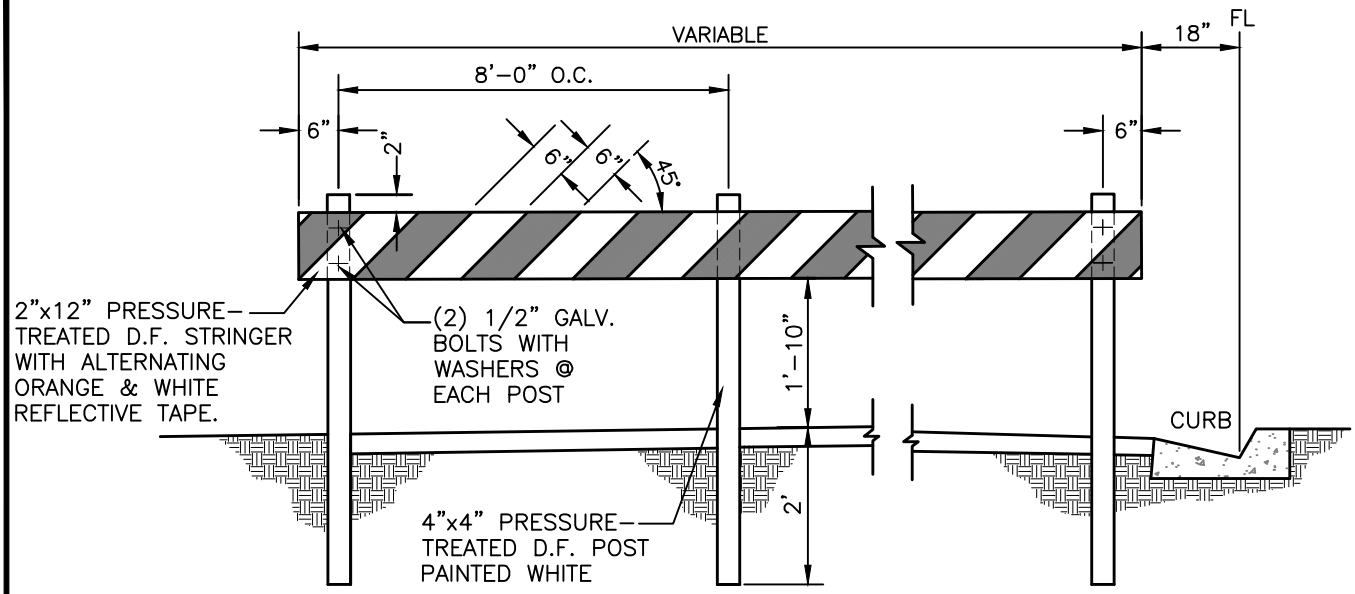
IN EXISTING SIDEWALK **IN PLANTER AREA**

NOTES:

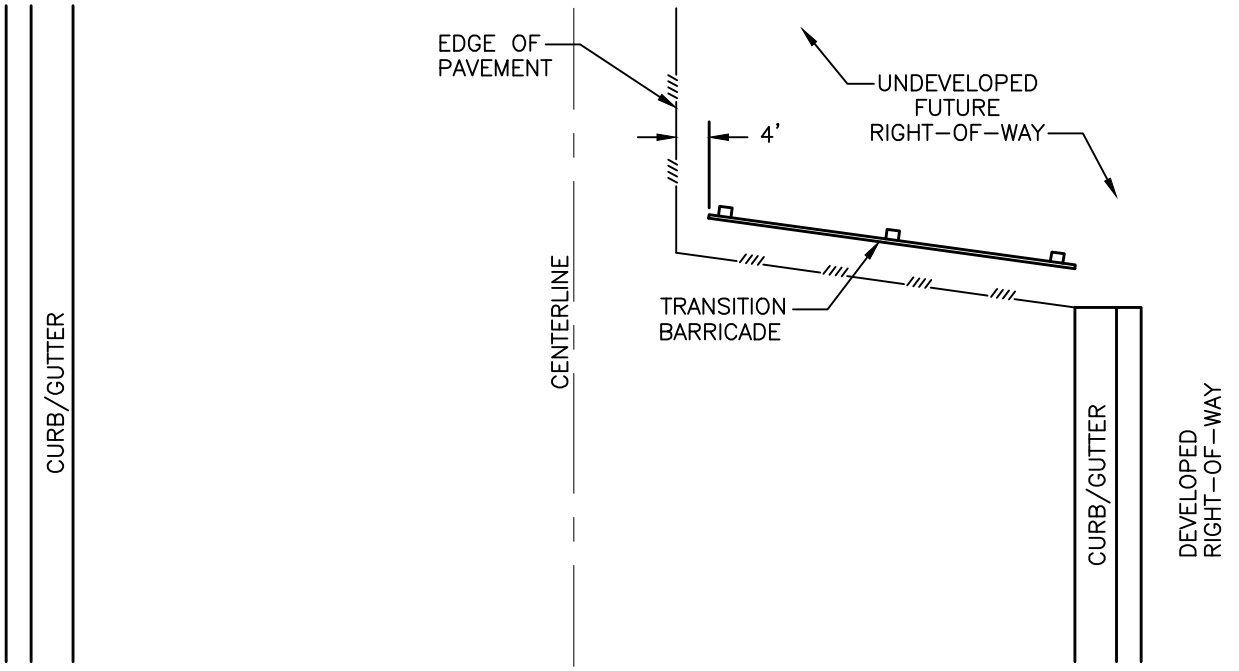
1. 2'-0" IN PARKSTRIP OR OTHER LOCATION AS APPROVED BY THE CITY ENGINEER.
2. SHEETING SHALL BE A PRISMATIC HIGH INTENSITY AVERY DENNISON T-6500, CALTRAN TYPE IV, OR EQUAL.
3. ALL SIGNS SHALL BE PROTECTED WITH 3M ANTI-GRAFFITI FILM OR EQUAL.

STOP SIGN INSTALLATION

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: TC-6
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



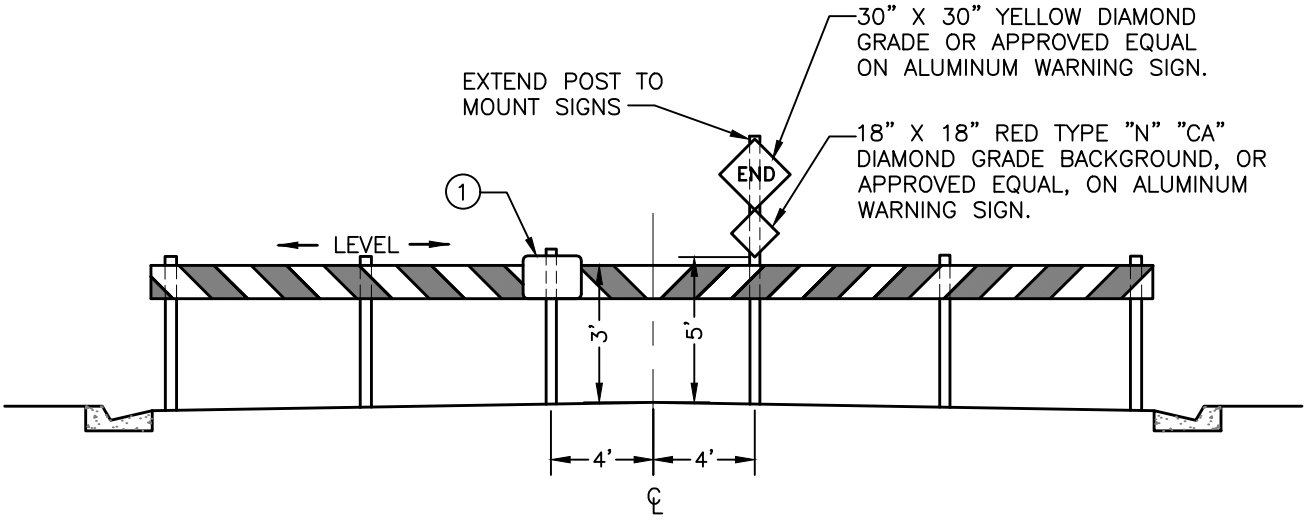
PROFILE



PLAN

TRANSITION BARRICADE DETAIL

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: TC-7
	CHECKED BY: NAME	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



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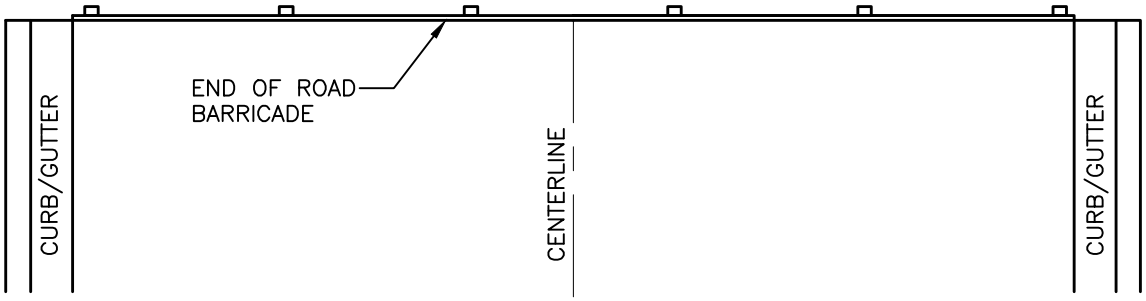
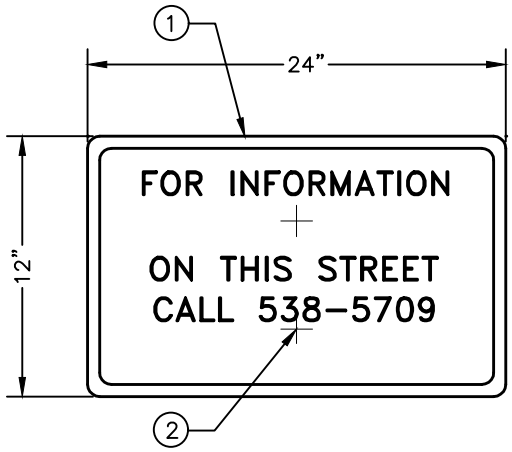


PLAN



INFORMATION SIGN

NOTES

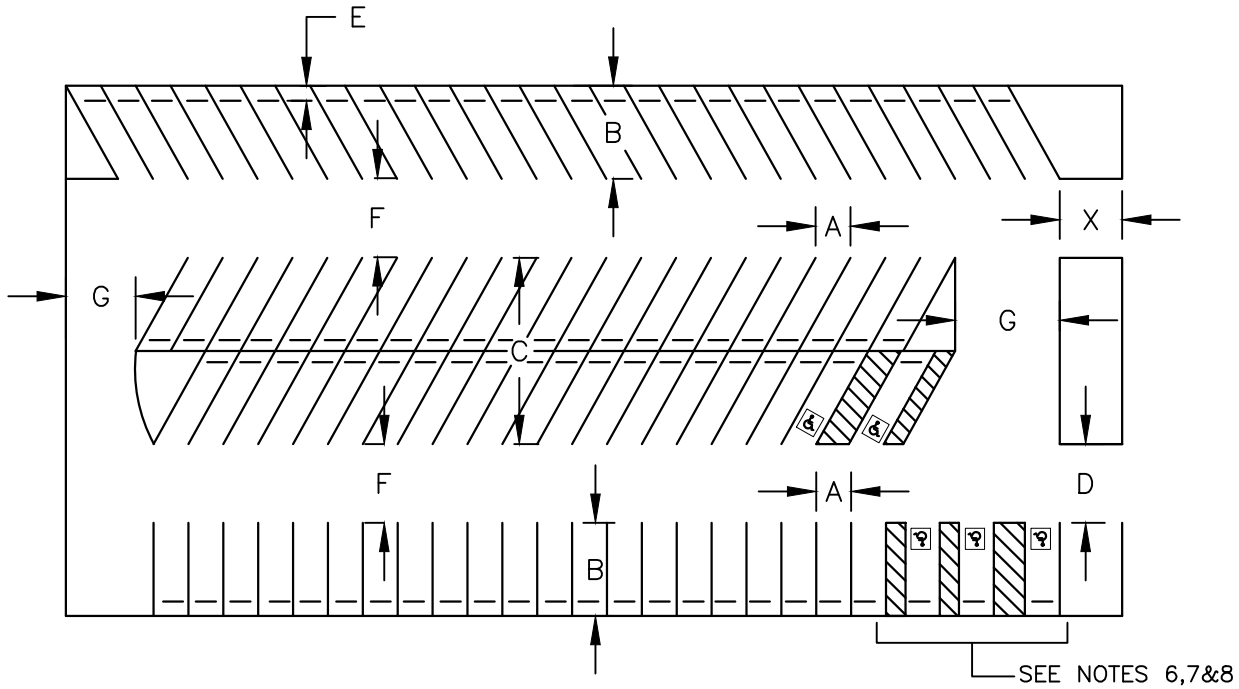
1. 12" X 24" GREEN ENGINEERING GRADE OR APPROVED EQUAL WITH 2" REFLECTIVE WHITE LETTERS ON A 1/2" A.C. EXTERIOR PLYWOOD WITH TREATED EDGES.
2. (2) 5/16 X 6-1/2 BUTTONHEAD ZINC-COATED BOLTS WITH FIBER WASHERS, LOCK WASHERS AND HEX NUTS.

ROAD END BARRICADE DETAIL

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: TC-8
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

PARKING SPACE AND AISLE DIMENSIONS TABLE

ANGLE	STALL WIDTH (A)	STALL DEPTH (B)	DOUBLE SPACE DEPTH (C)	EISLE WIDTH (F)
45 °	12.7'	19.1'	31.8'	8.8'
50°	11.7'	19.6'	33.4'	9.8'
55°	11.0'	19.9'	34.7'	12.2'
60°	10.4'	20.1'	35.7'	15.8'
70°	9.6'	20.0'	36.9'	19.0'
80°	9.1'	19.3'	37.0'	21.7'
90°	9.0'	18.0'	36.0'	24.0'



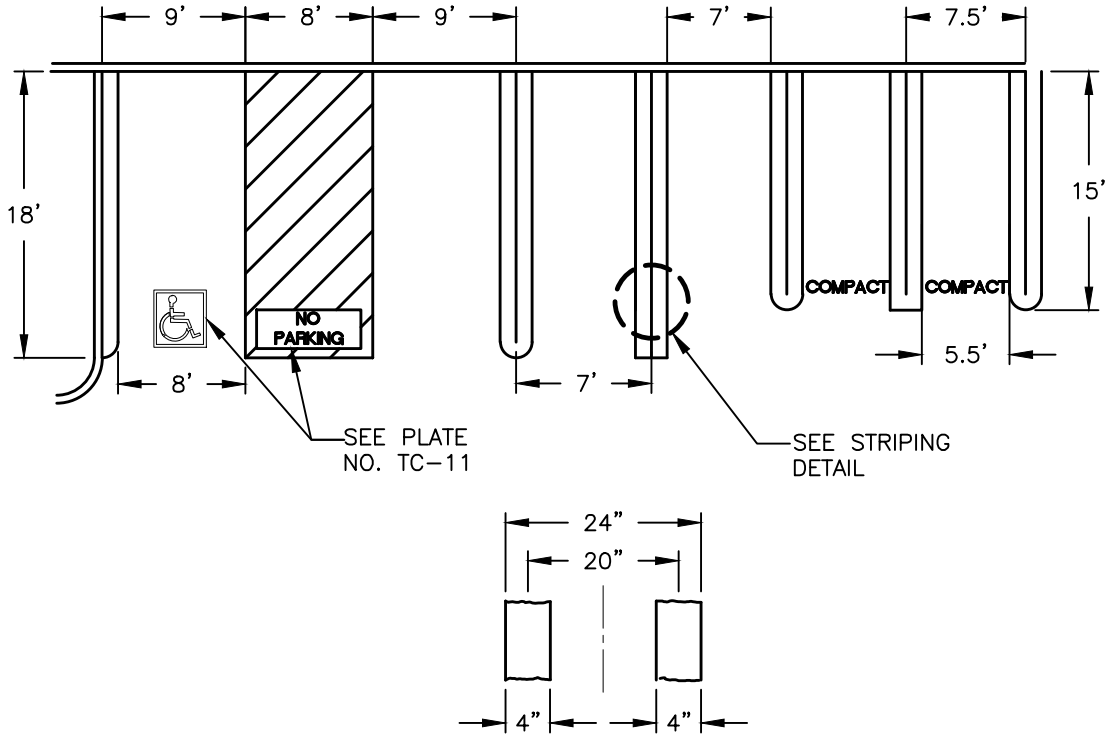
TYPICAL PARKING LOT DIAGRAM

NOTES:

1. FOR ANY GIVEN PARKING BETWEEN 45° AND 90° NOT SPECIFICALLY LISTED IN THE ABOVE TABLE, USE A TABLE ANGLE NEAREST THE GIVEN ANGLE.
2. THE MINIMUM AISLE WIDTH (F) AT ANY PARKING STALL ANGLE LESS THAN 45°, INCLUDING PARALLEL STALLS, IS 8.8 FEET.
3. THE TURNABOUT OR END DRIVEWAY WIDTH (G) SHALL BE A MINIMUM OF 18 FEET THE WHEELSTOP SET–BACK DIMENSION (E) SHALL BE A MINIMUM OF 2 FEET FOR ANY PARKING PLAN.
4. THE MINIMUM DRIVEWAY WIDTH (D) FOR ONE WAY TRAFFIC IS 10 FEET AND FOR TWO–WAY TRAFFIC IS 20 FEET.
5. THE REQUIRED FRONT SETBACK DIMENSION (X) SHALL BE AS SPECIFIED FOR THE ZONE IN WHICH THE PARKING LOT IS TO BE LOCATED.
6. THE LOADING AND UNLOADING AISLE SHALL BE ON THE PASSENGER SIDE OF THE VEHICLE, 5 FEET MIN BETWEEN REGULAR ACCESSIBLE PARKING STALLS AND 8 FEET TO THE RIGHT OF EACH VAN ACCESSIBLE PARKING STALL AS THE VEHICLE PULLS IN FORWARD IN TO THE STALL.
7. THE WORDS "NO PARKING", SHALL BE PAINTED IN 1 FEET HIGH WHITE LETTERS.
8. ISA=INTERNATIONAL SYMBOL OF ACCESSIBILITY TO BE PAINTED PER DETAIL A ON PLATE TC–11 ON EVERY ACCESSIBLE PARKING STALL. FOR MINIMUM NUMBER OF ACCESSIBLE PARKING STALLS SEE PLATE TC–13.

OFF STREET PARKING STANDARD REQUIREMENT

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: TC–9 COUNCIL APPROVAL DATE DATE 03/26/2018



STRIPING DETAIL

NOTES

PLANS:

THE PLAN OF THE PROPOSED PARKING AREA SHALL BE SUBMITTED TO THE BUILDING DEPARTMENT AT THE TIME OF THE APPLICATION FOR THE BUILDING PERMIT FOR THE BUILDING TO WHICH THE PARKING AREA IS ACCESSORY. THE PLANS SHALL CLEARLY INDICATE THE PROPOSED DEVELOPMENT, INCLUDING LOCATION, SIZE, DESIGN, CURB CUTS, LIGHTING, LANDSCAPING AND OTHER FEATURES AND APPURTENANCES OF THE PROPOSED PARKING AREA. SEE PLATES NO. TC-11, TC-12, TC-13 AND TC-14 FOR HANDICAPPED PARKING REQUIREMENTS.
IF DESIRED 30% OF REQUIRED PARKING STALLS MAY BE DESIGNATED FOR PARKING OF COMPACT CARS. COMPACT CAR STALLS SHALL BE 7-1/2' WIDE AND 15' IN LENGTH FOR 90 DEGREE ANGLE. EACH COMPACT CAR SPACE SHALL BE IDENTIFIED WITH WORD "COMPACT" PAINTED ON THE PAVEMENT.

SURFACE OF PARKING AREA:

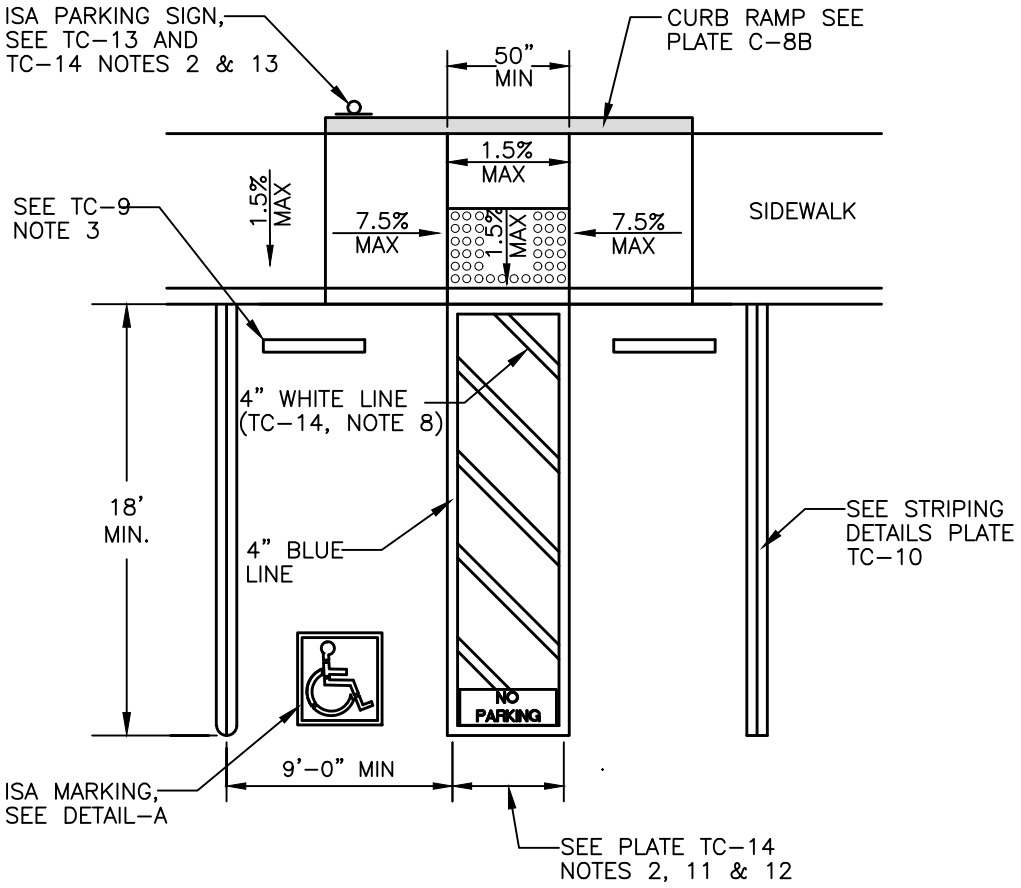
PARKING AREAS SHALL BE PAVED WITH A MINIMUM OF TWO (2) INCHES OF ASPHALT SURFACE AND SHALL BE SO GRADED AND DESIGNED AS TO DISPOSE OF ALL SURFACE WATER IN ACCORDANCE WITH REQUIREMENTS OF THE CITY ENGINEER.

STRIPING OF PARKING AREA:

PARKING AREAS SHALL BE MARKED BY EITHER STRIPING OR BUTTONS TO DELINEATE APPROVED STALLS AS SHOWN ON THE PLANS. SEE DIAGRAM BELOW. STALLS SHALL BE DOUBLE STRIPED AS SHOWN IN THE DIAGRAM. PAINTED LINE WIDTH SHALL BE 4". IF BUTTONS ARE USED THEY SHALL BE NO MORE THAN 3' ON CENTER. THE LINES SHALL BE LAID OUT AS PER DIAGRAM. EITHER SEMICIRCULAR CAP OR A STRAIGHT CAP MAY BE USED.

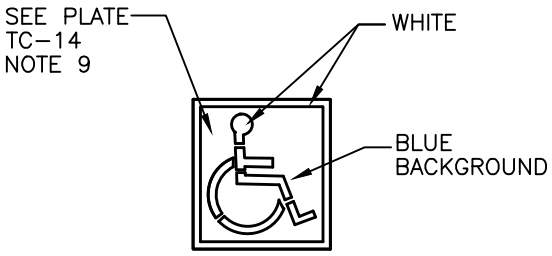
OFF STREET PARKING DETAILS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: TC-10 COUNCIL APPROVAL DATE DATE 03/26/2018



SINGLE ACCESSIBLE PARKING STALL

PAVEMENT MARKING

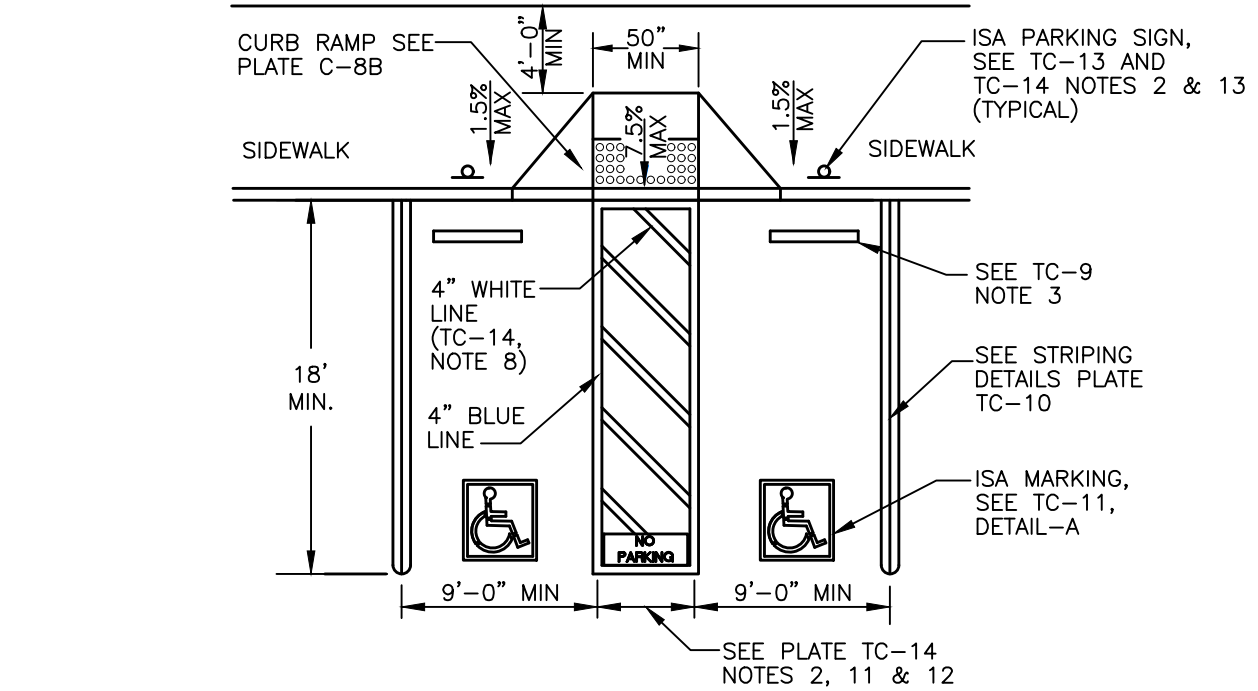


ISA MARKING

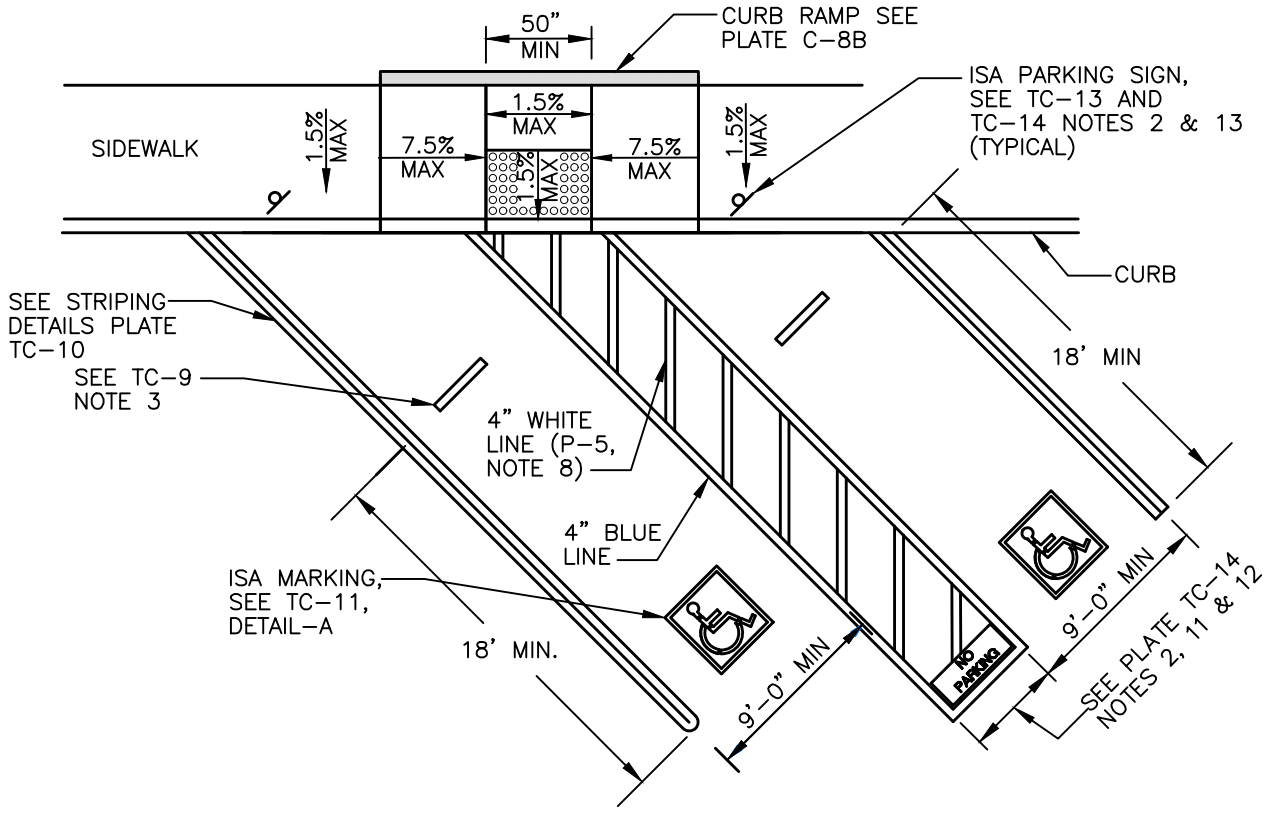
DETAIL-A

DISABLE/ACCESSIBLE PARKING-SINGLE STALL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: TC-11
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



DOUBLE ACCESSIBLE PARKING STALL



DIAGONAL DOUBLE ACCESSIBLE PARKING STALL

DISABLE/ACCESSIBLE PARKING-DOUBLE STALLS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: TC-12
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

SIGN R99 (CA)

PLAQUE R99B (CA)

SIGN R99 (CA) with PLAQUE R99B (CA)
SEE PLATE TC–14 NOTE 6

SIGN R99C (CA)
SEE PLATE TC–14 NOTE 6

SIGN R100B (CA)
SEE PLATE TC–14 NOTE 10

SIGN R7–8b
SEE PLATE TC–14 NOTES 2 & 6

ACCESSIBLE PARKING OFF–STREET PARKING SIGNS

Total Number of Parking Spaces or Stalls	Minimum Number of Regular Disabled Parking Spaces or Stalls	Minimum Number of "Van Accessible" Disabled Parking Spaces or Stalls
1–25	0	1
26–50	1	1
51–75	2	1
76–100	3	1
101–150	4	1
151–200	5	1
201–300	5	2
301–400	6	2
401–500	7	2
501–1000	2 percent of total	1 in every 6 Disabled Parking Spaces must be "Van Accessible"
Greater than 1001	20 plus 1 for each 100 or fraction thereof over 1001	

REQUIRED NUMBER OF ACCESSIBLE OFF–STREET PARKING SPACES

DISABLE/ACCESSIBLE PARKING–SIGNS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: TC–13 COUNCIL APPROVAL DATE DATE 03/26/2018

NOTES:

1. Accessible parking spaces serving a particular building shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance. In parking facilities that do not serve a particular building, accessible parking shall be located on the shortest accessible route of travel to an accessible pedestrian entrance of the parking facility.

2. One in every eight accessible off–street parking stalls, but not less than one, shall be served by an accessible aisle of 8'–0" minimum width and shall be signed van accessible. The R7–8b sign shall be mounted below the R99B (CA) plaque or the R99C (CA) sign.

3. In each parking stall, a curb or bumper shall be provided and located to prevent encroachment of vehicles over the required width of walkways. Parking stalls shall be so located that persons with disabilities are not compelled to wheel or walk behind parked cars other than their own.

4. Surface slopes of accessible off–street parking stalls shall be the minimum possible and shall not exceed 2 percent in any direction.

5. Table from standard plate P–1 shall be used to determine the required number of accessible parking stalls in each parking lot or garage.

6. Where Plaque R99B (CA), Sign R99C (CA) or Sign R7–8b are installed, the bottom of the sign or plaque panel shall be a minimum of 7'–0" above the surrounding surface.

7. Curb ramps shall conform to the details shown on the City Standard Plan C–6A.

8. 4" White line diagonals at 3'–0" Max center.

9. The words "NO PARKING", shall be painted in white letters no less than 1'–0" high and located so that it is visible to traffic enforcement officials. See Caltrans Standard Plan A90B for details of the "NO PARKING" pavement marking. For ISA marking detail see Caltrans Std Plan A24C.

10. A R100B (CA) sign shall be posted in a conspicuous place at each entrance to off–street parking facilities or immediately adjacent to and visible from each stall. The sign shall include the address where the towed vehicle may be reclaimed and the telephone number of the local traffic law enforcement agency.

11. Where a single (non–van) accessible parking space is provided, the 5'–0" loading and unloading access aisle shall be on the passenger side of the vehicle as the vehicle is going forward into the parking space.

12. Where a van accessible parking space is provided, the loading and unloading access aisle shall be 8'–0" wide minimum, and shall be on the passenger side of the vehicle as the vehicle is going forward into the parking space.

13. Accessible Parking Only Sign shall be Sign R99C (CA) or Sign R99 (CA) with Plaque R99B (CA).

DISABLE/ACCESSIBLE PARKING–GENERAL NOTES

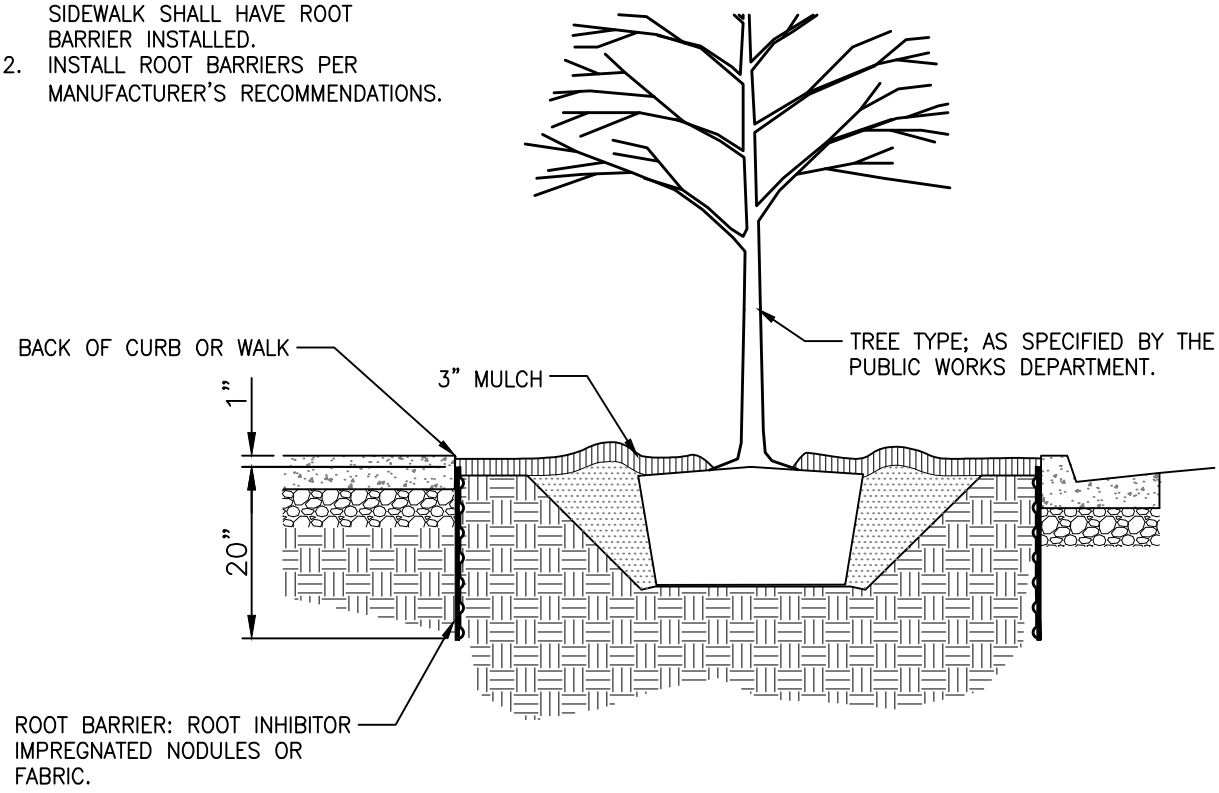
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: TC–14 COUNCIL APPROVAL DATE DATE 03/26/2018

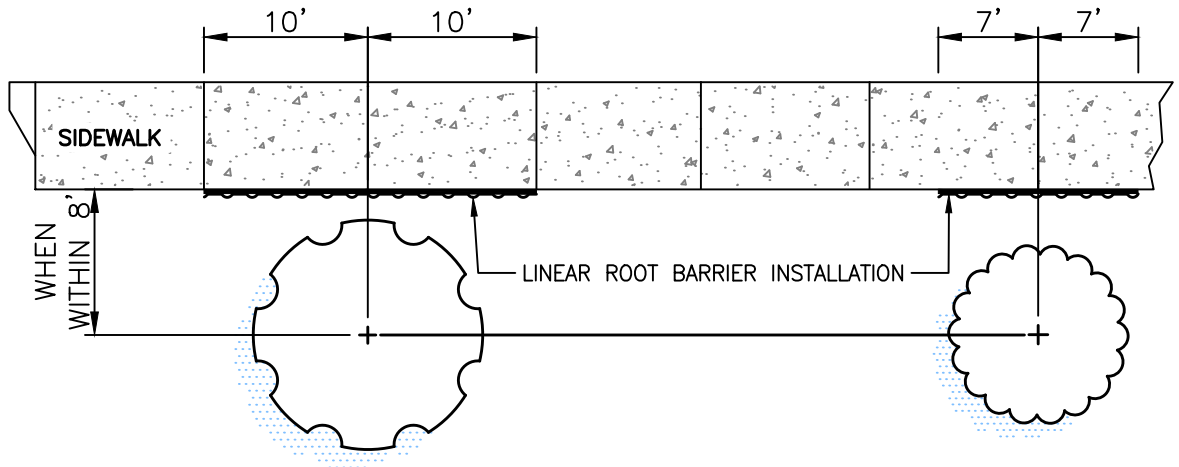
CITY OF CERES
STANDARD DESIGNS

LANDSCAPE AND IRRIGATION

NOTES:

1. ALL TREES WITHIN 8' OF A CURB OR SIDEWALK SHALL HAVE ROOT BARRIER INSTALLED.
2. INSTALL ROOT BARRIERS PER MANUFACTURER'S RECOMMENDATIONS.





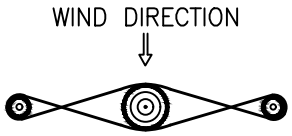
>25' DIA CANOPY: **<25' DIA CANOPY:**

ROOT BARRIER DETAIL

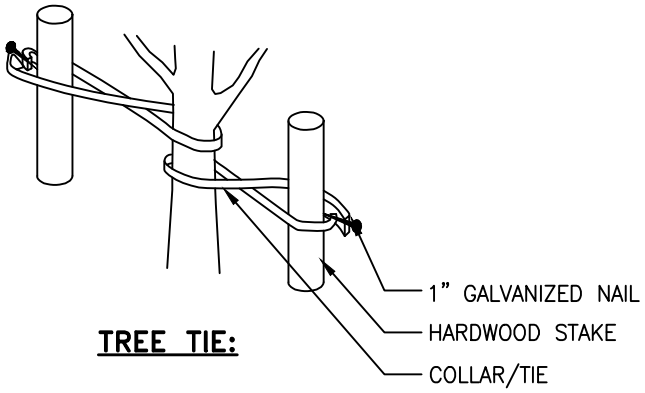
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: LS-1
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018

NOTES:

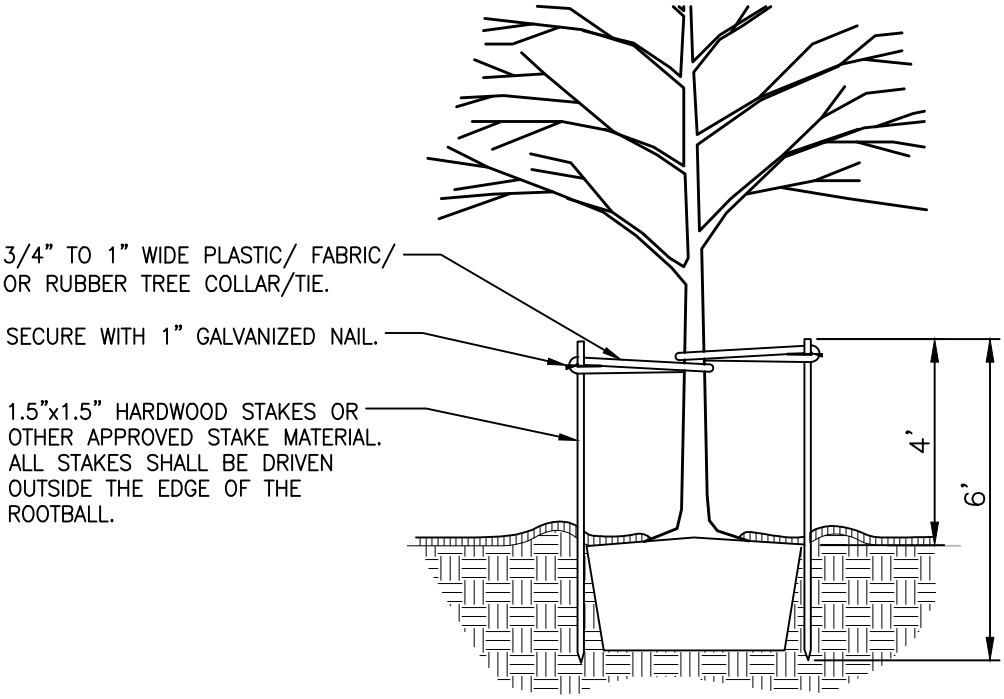
1. TIGHTEN CABLES AND TIES ONLY ENOUGH TO KEEP FROM SLIPPING. ALLOW FOR SOME TRUNK MOVEMENT. FABRIC LOOPS SHALL BE LONG ENOUGH TO ACCOMMODATE 1.5 IN. OF GROWTH AND BUFFER ALL BRANCHES FROM THE CABLE.
2. TUCK ANY LOOSE ENDS OF THE WIRE OR CABLE INTO THE WIRE WRAP SO THAT NO SHARP WIRE ENDS ARE EXPOSED.
3. INSTALL THREE GUY WIRES PER TREE, SPACED EVENLY AROUND THE TRUNK.
4. ASSURE THAT THE BEARING SURFACE OF THE PROTECTIVE COVERING OF THE CABLE AGAINST THE TREE TRUNK IS A MINIMUM OF 0.5 IN.
5. STAKES TO BE INSTALLED A MINIMUM OF 12" FROM TRUNK OR JUST OUTSIDE THE ROOTBALL, WHICHEVER IS GREATER.
6. REMOVE ALL STAKING AS SOON AS THE TREE HAS GROWN SUFFICIENT ROOTS.
7. STAKES SHALL BE REMOVED NO LATER THAN THE END OF THE FIRST GROWING SEASON AFTER PLANTING.
8. TREES WITH POOR QUALITY ROOT BALLS OR ROOT BALLS THAT HAVE BEEN CRACKED OR DAMAGED TO BE REJECTED.
9. REMOVE ALL NURSERY STAKES UPON INSTALLATION. TREES THAT HAVE GROWN TOO CLOSE TOGETHER IN THE NURSERY, RESULTING IN WEAK TRUNKS TO BE REJECTED.



TREE TIE PLAN VIEW:



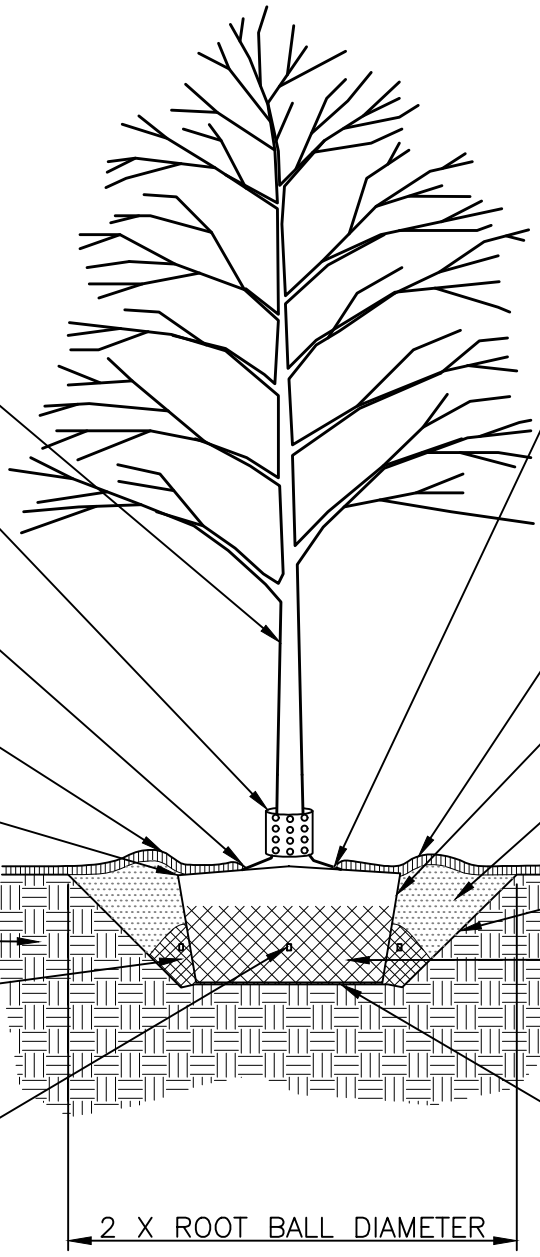
TREE TIE:



TREES LESS THAN 3" CALIPER/36" BOX

TREE STAKING DETAIL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS-2
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



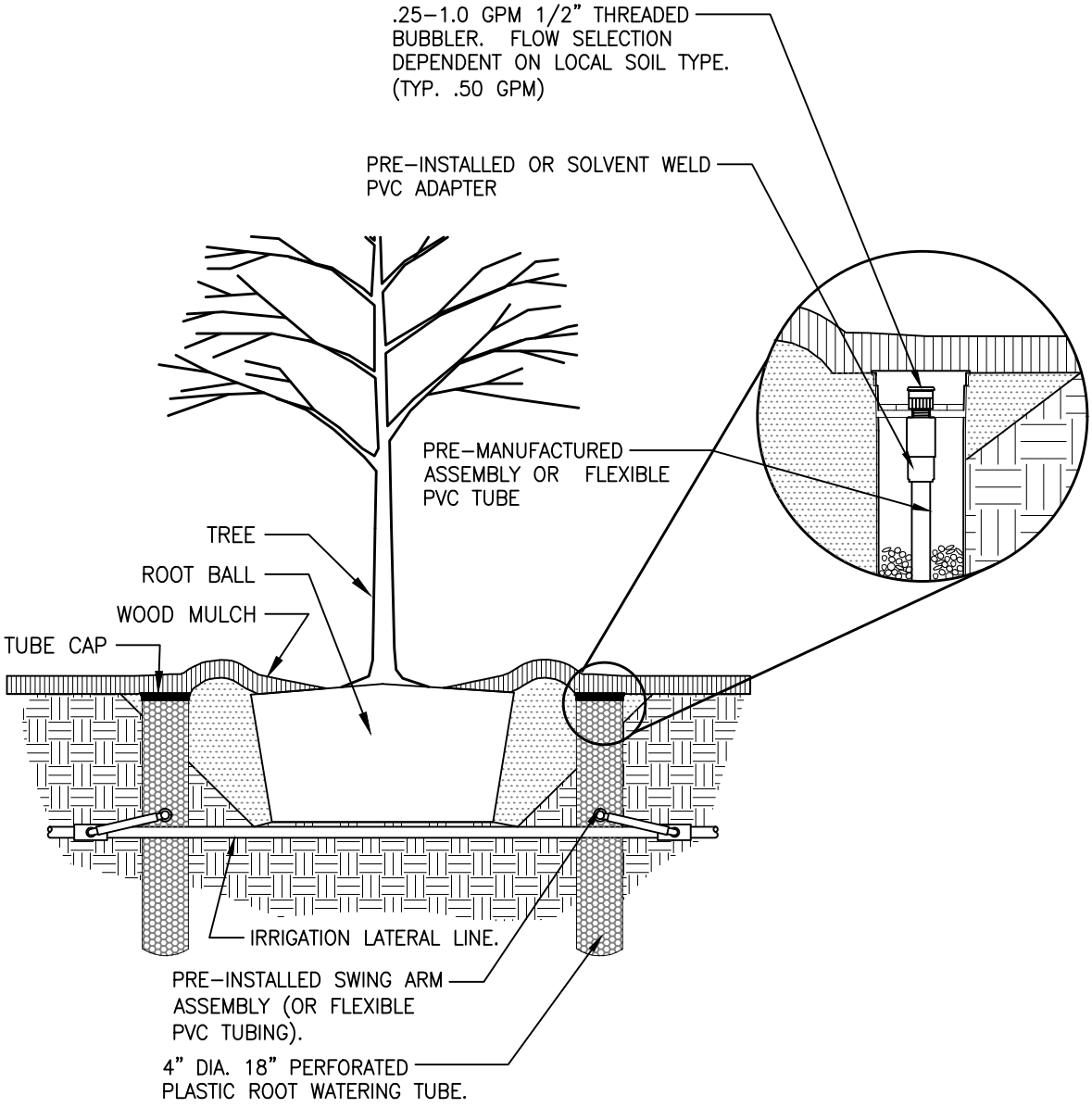
NOTES:

1. DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO–DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CANOPY.
2. SEE STAKING DETAIL FOR STAKING INFORMATION.
3. AMENDED SOIL MUST NOT BE SO COMPACTED AS TO IMPEDE ROOT GROWTH OR DRAINAGE. THE SOIL STRUCTURE SHALL NOT BE PLATY OR MASSIVE.
4. TREES WITH POOR QUALITY ROOT BALLS OR ROOT BALLS THAT HAVE BEEN CRACKED OR DAMAGED TO BE REJECTED.
5. TREES THAT HAVE GROWN TOO CLOSE TOGETHER IN THE NURSERY, RESULTING IN WEAK TRUNKS TO BE REJECTED.
6. DO NOT PLANT TREES WITHIN 10 FEET OF SEWER MAIN LINES OR SERVICE SEWER LATERAL.

RESIDENTIAL & RIGHT–OF–WAY PLANTINGS

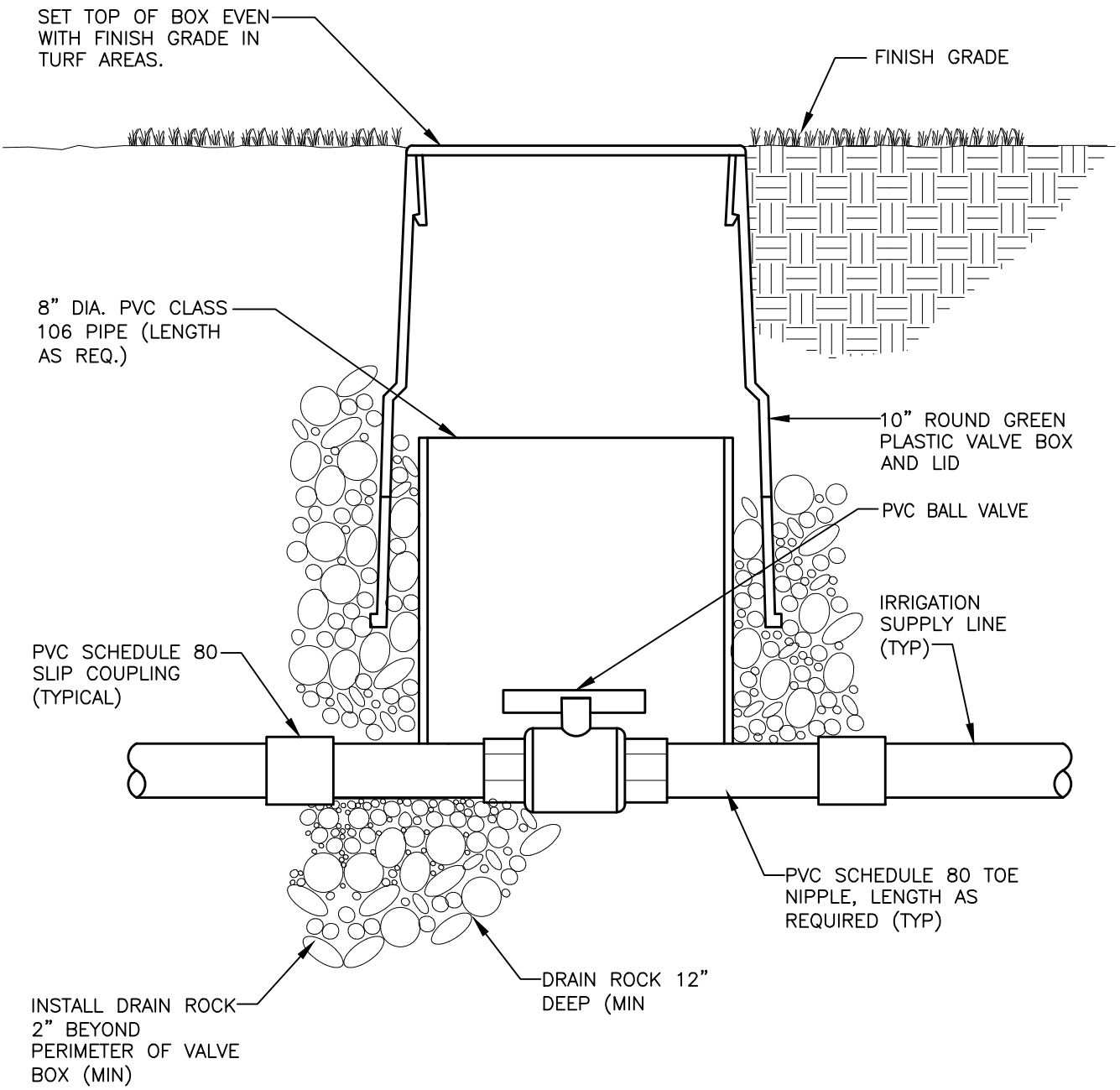
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS–3
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

NOTES:
1. POSITION 3 UNITS EVENLY SPACED AROUND PLANT. WHEN POSSIBLE, INSTALL IN DIRECT CONTACT WITH ROOT BALL.
2. INSTALL PRODUCT FLUSH WITH GROUND SURFACE.
3. WHEN INSTALLING IN EXTREMELY HARD OR CLAY SOILS, ADD ¾" GRAVEL UNDER AND AROUND THE UNIT
4. WHEN INSTALLED IN SANDY SOILS, INSTALL WITH FABRIC SOCK.
5. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.



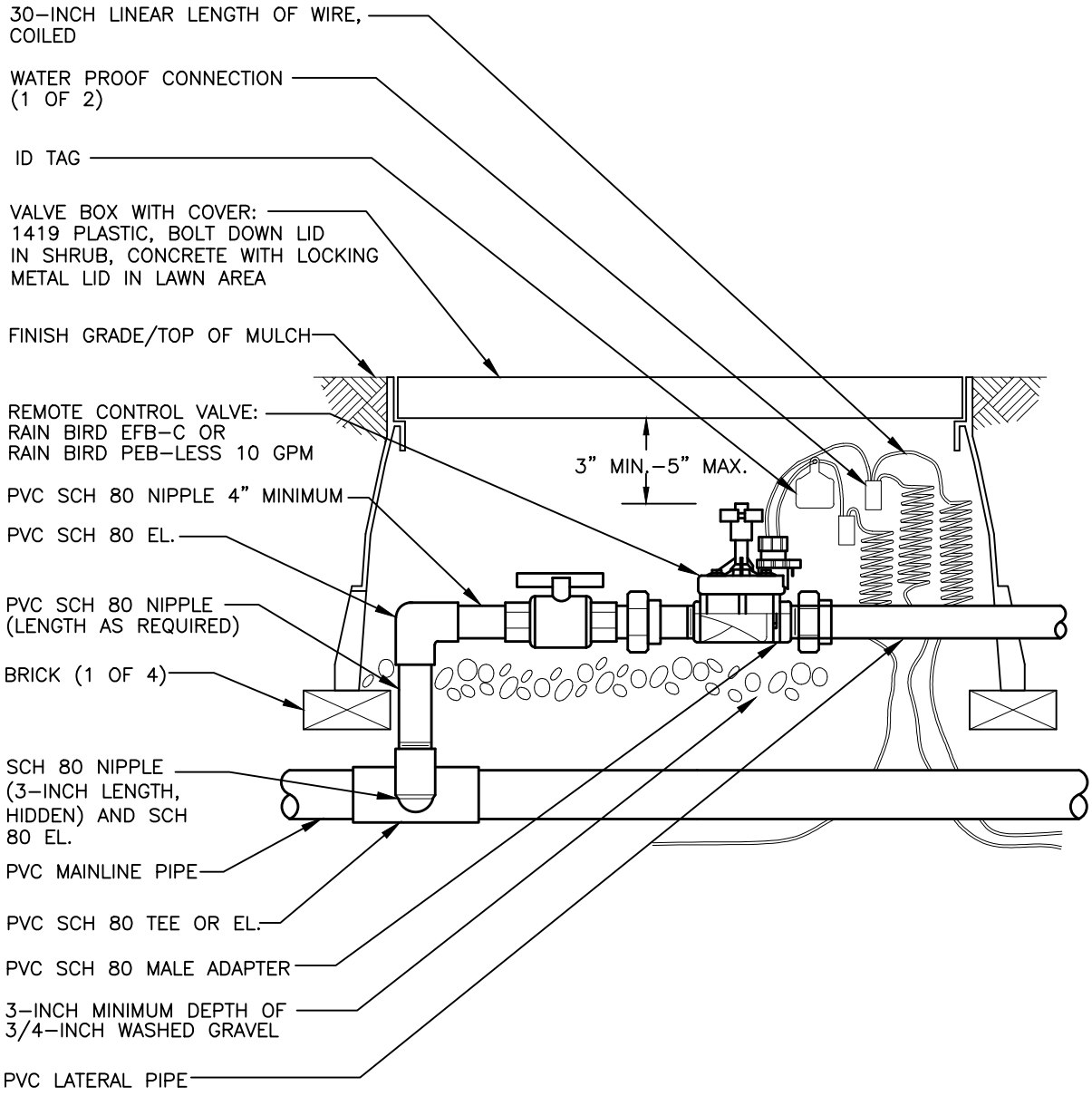
BUBBLER INSTALLATION DETAILS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS–4
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



IRRIGATION BALL VLAVE ASSEMBLY DETAIL

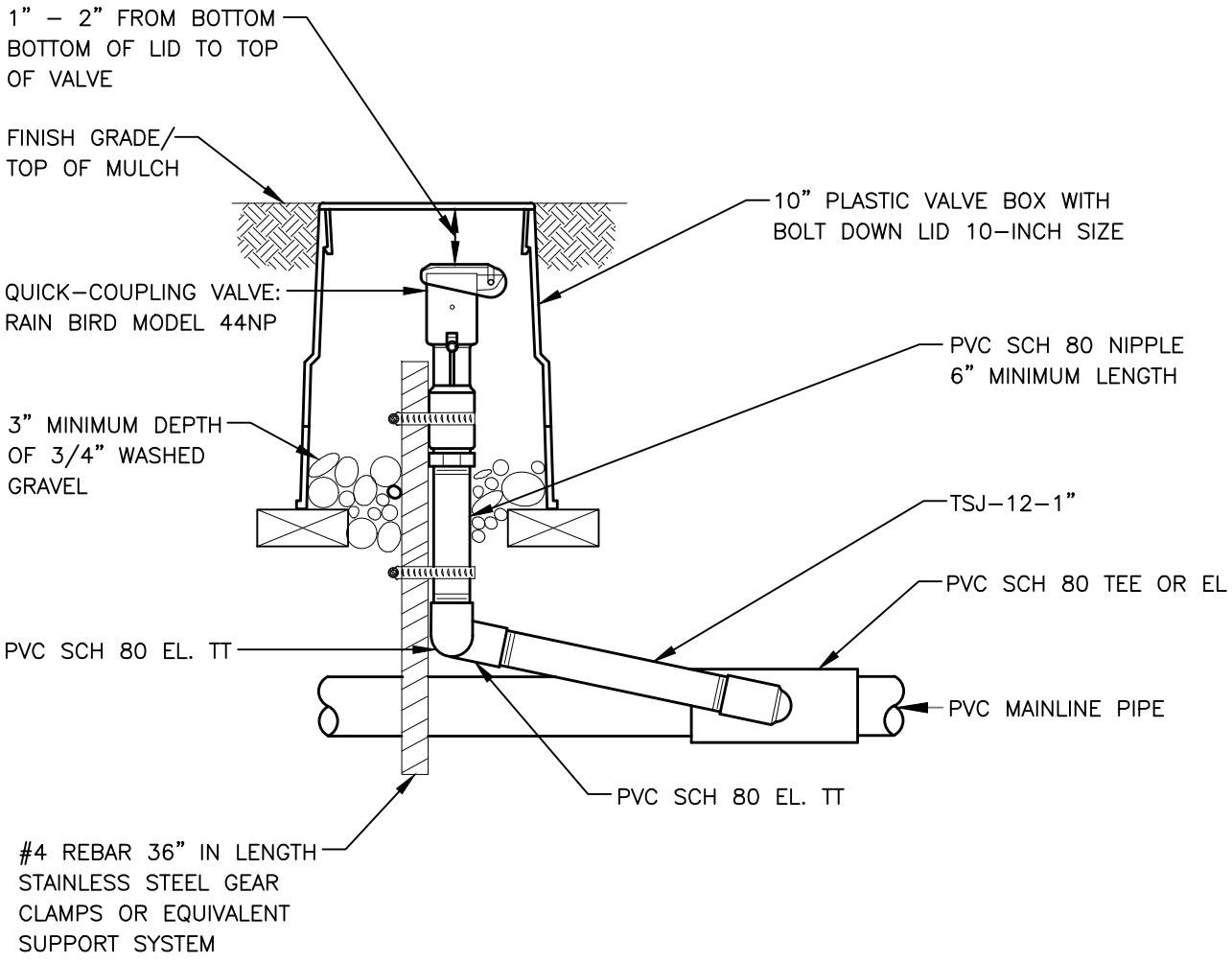
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: LS-5
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



NOTE: USE 1419 CONCRETE VALVE BOX WITH BOLT DOWN LIDS IF INSTALLED IN SIDEWALK AREA. SET FLUSH TO GRADE. HARD GLUE ALL FITTINGS FROM POINT OF CONTACT TO BRASS BALL VALVE.

REMOTE CONTROL VALVE ASSEMBLY DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: LS–6 COUNCIL APPROVAL DATE DATE 03/26/2018

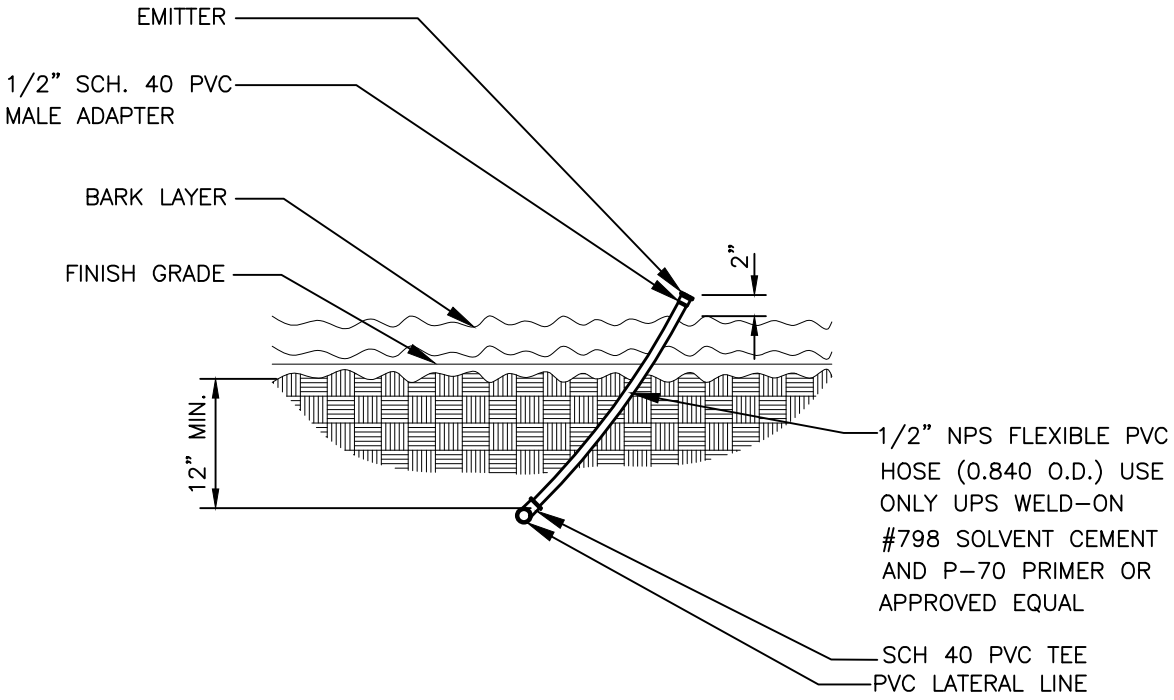


NOTE:

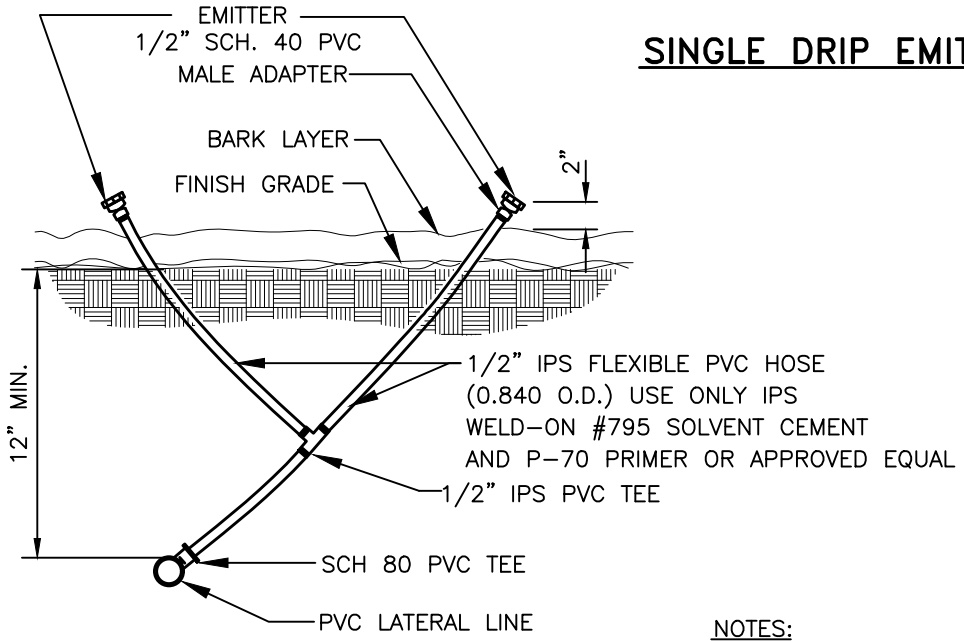
1. FURNISH FITTINGS AND PIPING SIZED THE SAME SIZE AS THE INLET SIZE OF THE QUICK COUPLING VALVE.

STANDARD QUICK–COUPLING VALVE ASSEMBLY DETAIL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: LS–7
CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



SINGLE DRIP EMITTER INSTALLATION



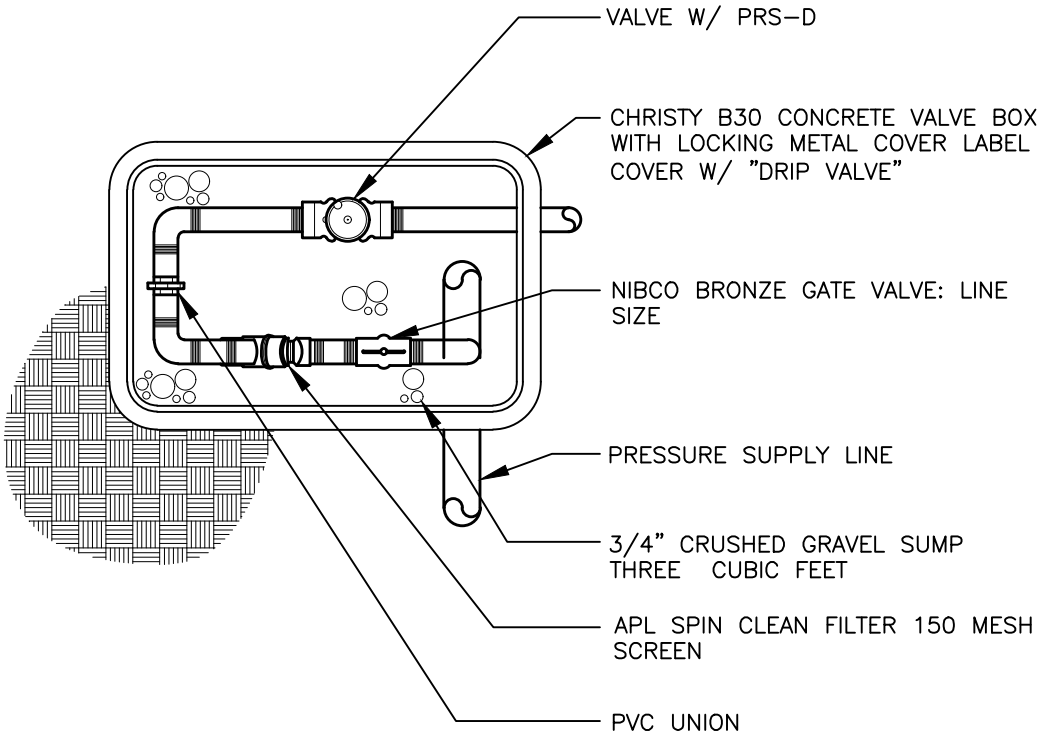
MULTI DRIP EMITTER INSTALLATION

NOTES:

1. PLACE EMITTER 4" FROM CENTER LINE OF SHRUB.
2. EMITTER MUST BE VISIBLE TO MAINTENANCE PERSONNEL.
3. USE MULTI DRIP EMITTER FOR TREE AND GROUND COVER AREAS ONLY. INSTALL UP TO 3 EMITTERS PER MULTI-DRIP EMITTER.

DRIP EMITTER ASSEMBLY DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: LS-8 COUNCIL APPROVAL DATE DATE 03/26/2018

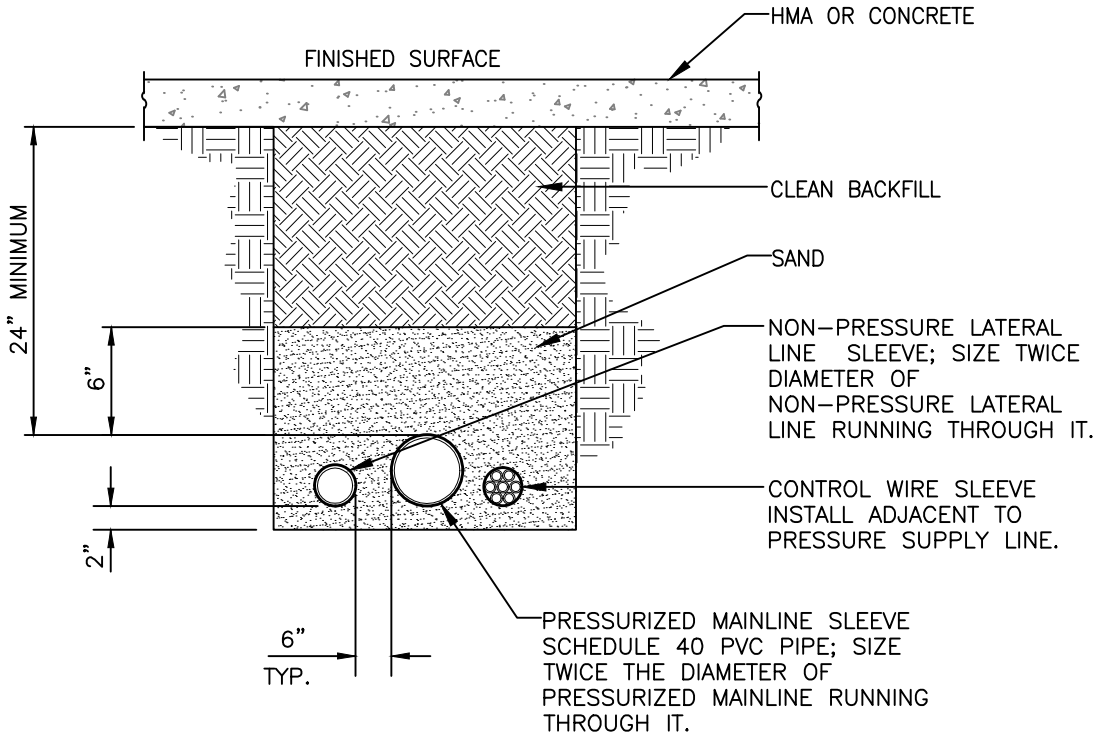


NOTES:

1. INSTALL ASSEMBLY TO REST ON GRAVEL SUMP. CONTAIN ENTIRE ASSEMBLY WITHIN VALVE BOX. NO EXTENSIONS ACCEPTED.
2. VALVE BOX TO BE 2" ABOVE FINISH GRADE IN ALL TURF AREAS AND 3" ABOVE FINISH GRADE IN ALL PLANTER AREAS.

DRIP VALVE ASSEMBLY

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	**PREPARED BY:** SER **CHECKED BY:** DRJ **SCALE:** NONE	CITY OF CERES **ENGINEERING DEPARTMENT** **APPROVED BY** **CITY ENGINEER – DARYL JORDAN – RCE** 58036	**PLATE NO:** LS-9 **COUNCIL APPROVAL DATE** DATE 03/26/2018

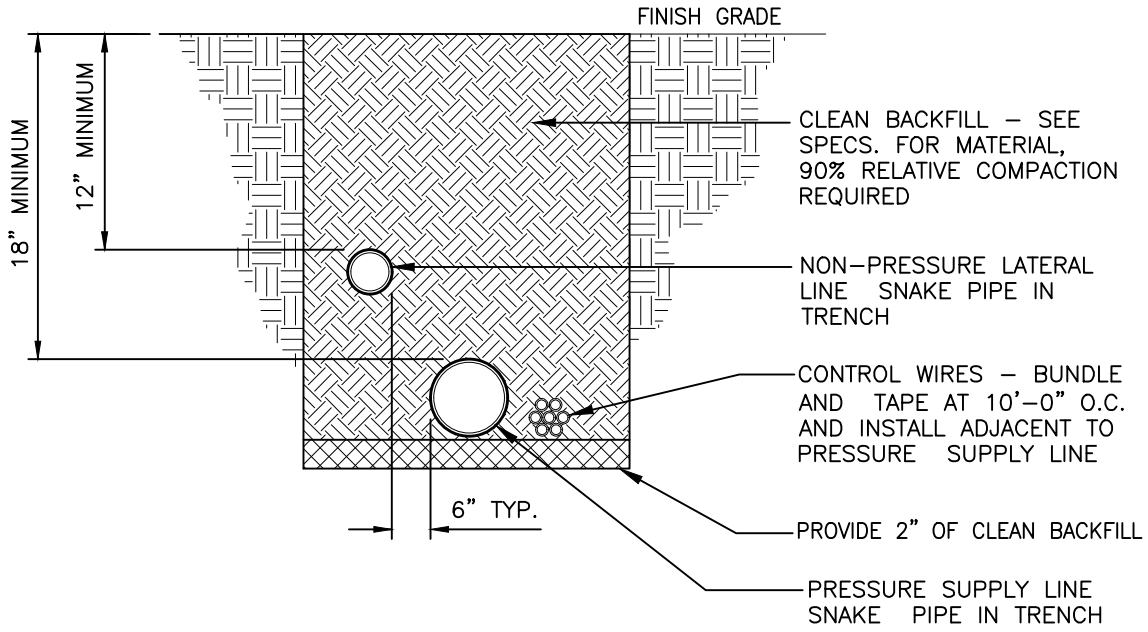


NOTES:

1. EXTEND ALL SLEEVES 12" BEYOND EDGE OF HARDSCAPING AT BOTH ENDS
2. COMPACT SOIL BACKFILL TO 90% THROUGH WATER JETTING. 4" OF SCREENED SAND REQUIRED AROUND MAIN LINE PRIOR TO WATER JET COMPACTION.
3. SCHEDULE 40 PVC PIPE MUST BE USED AS SLEEVE UNDER ALL PAVING, WITH A 4" SCREENED SAND COVER.
4. ALL IRRIGATION WIRE MUST HAVE A SEPARATE SLEEVE MEETING THE SAME STATED INSTALLATION CONDITIONS.

SLEEVING DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: LS–10 COUNCIL APPROVAL DATE DATE 03/26/2018



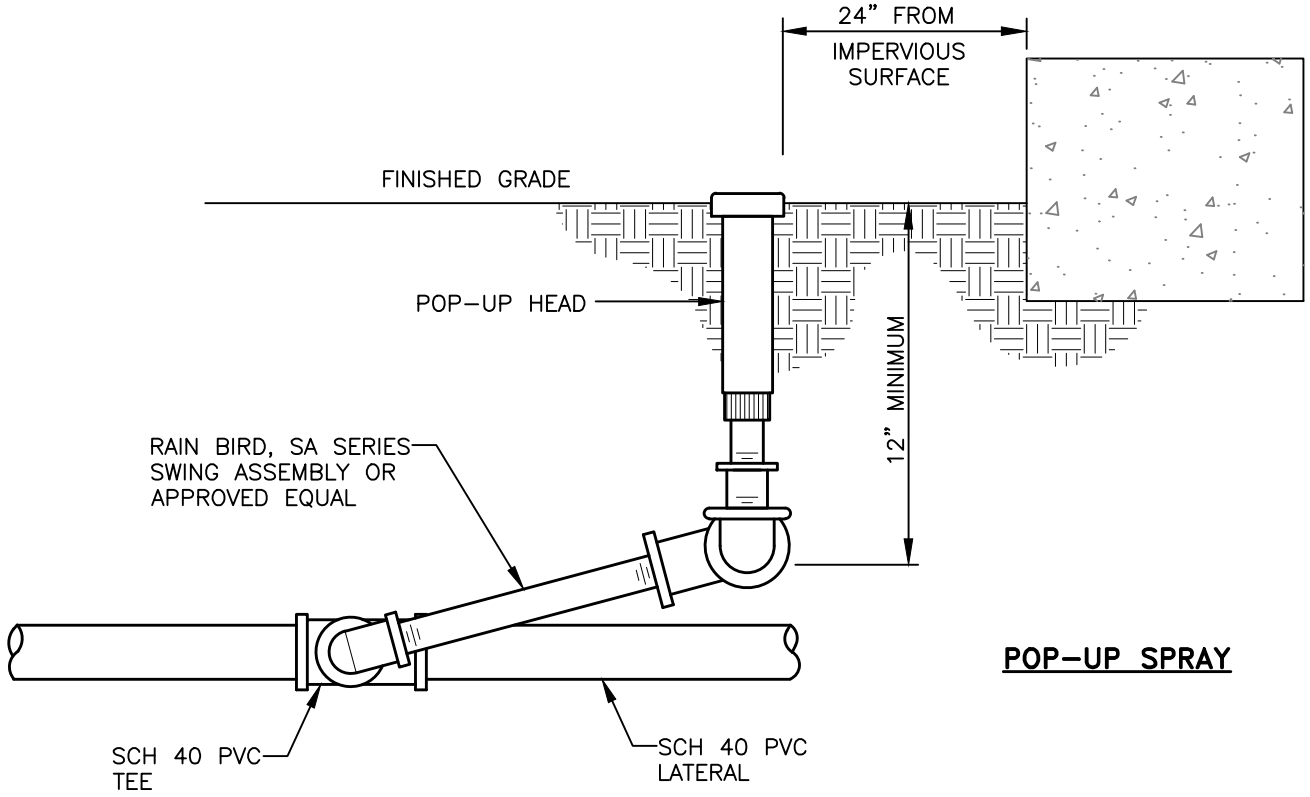
NOTES:

1. PIGTAIL AND LOOP CONTROL WIRE AT ALL 90 DEGREE CHANGES IN DIRECTION.

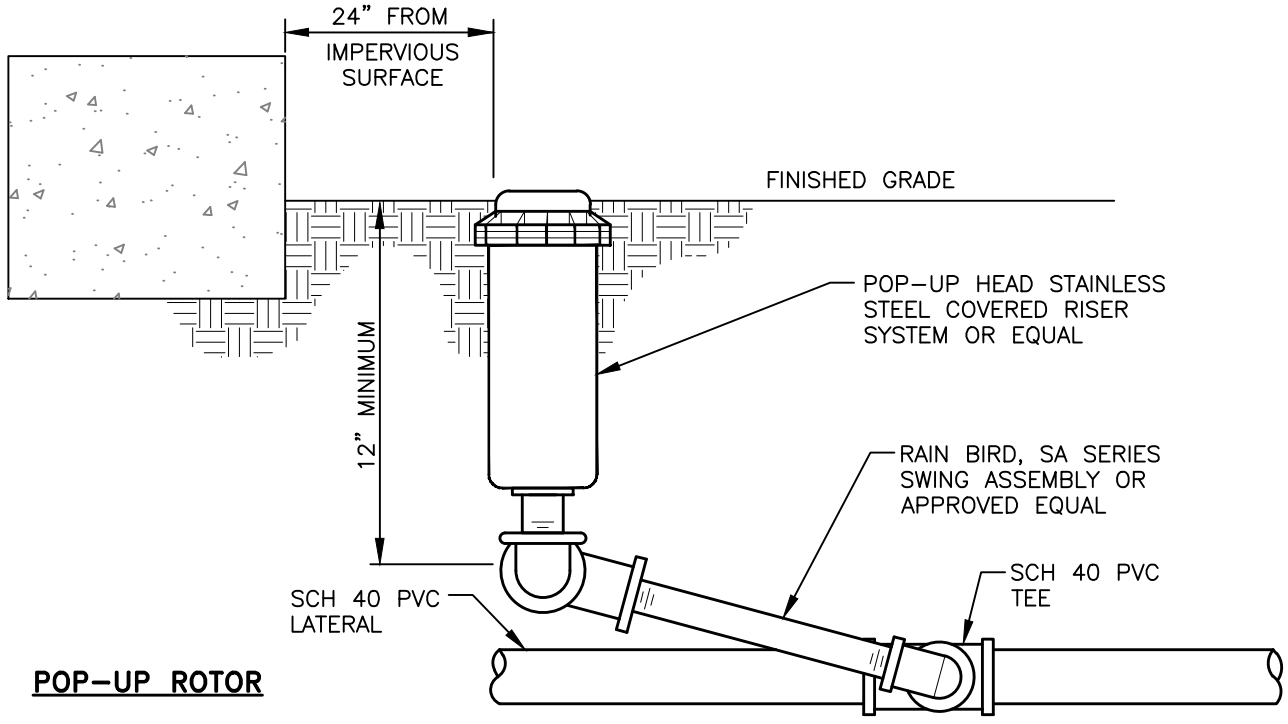
2. INSTALL MAIN LINE ACCORDING TO MANUFACTURER'S SPECIFICATIONS. COMPACT SOIL BACKFILL TO 90% THROUGH WATER JETTING. 4" OF SCREENED SAND REQUIRED AROUND MAIN LINE PRIOR TO WATER COMPACTION.

TRENCHING DETAIL

	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: LS–11
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



POP-UP SPRAY

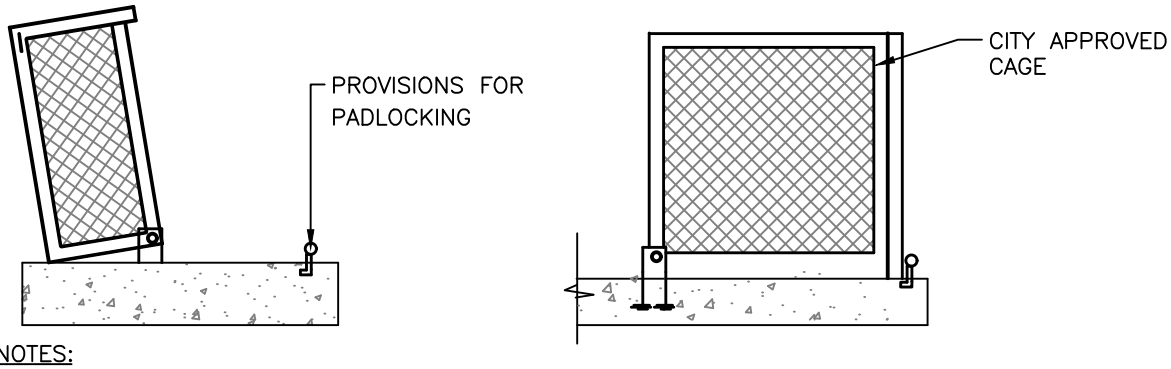


POP-UP ROTOR

POP-UP IRRIGATION HEADS

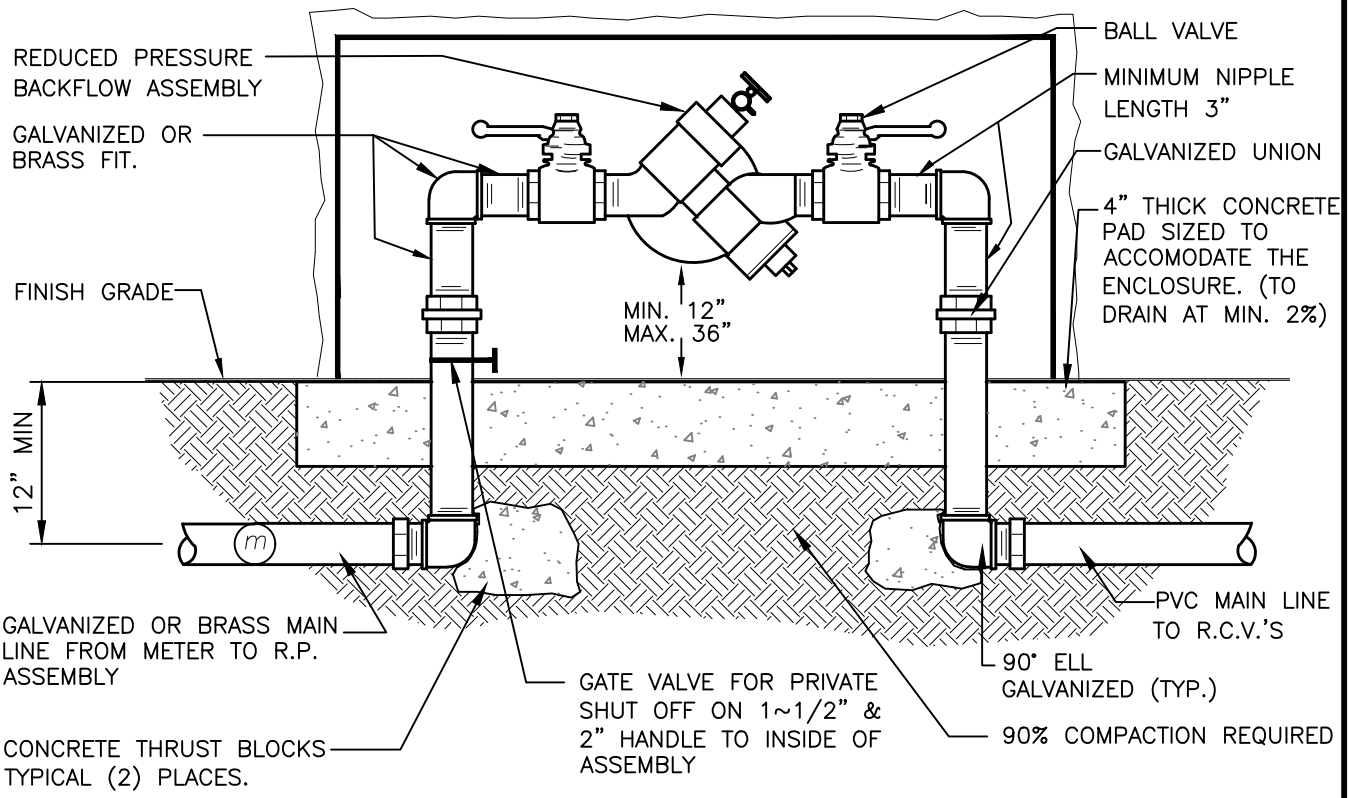
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS-12
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

ENCLOSURE FOR 2" AND SMALLER LINES;
LINES OVER 2" DIA, USE APPROVED BLANKET ONLY.



ENCLOSURE NOTES:

1. REFER TO MANUFACTURER'S CATALOG FOR CORRECT DIMENSIONS TO FIT SIZE OF SPECIFIED BACKFLOW.
2. CONCRETE FOUNDATION DIMENSIONS TO SUIT EACH INDIVIDUAL INSTALLATION. CONCRETE TO BE OUT 6" FROM CAGE AND SLOPED TO DRAIN.

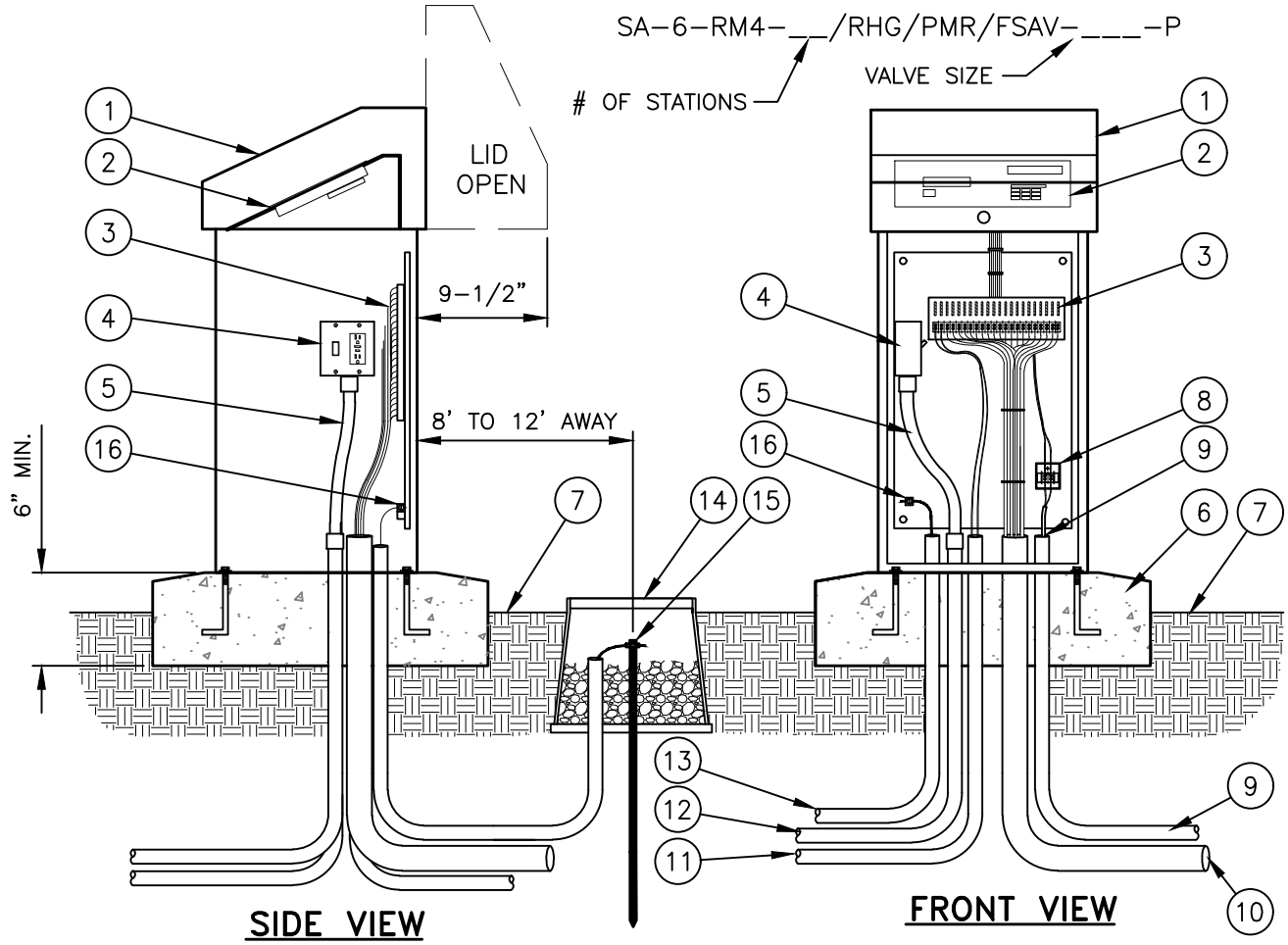


BACKFLOW NOTES:

1. EQUIPMENT TO BE INSTALLED AT A MINIMUM OF 24" FROM ANY STRUCTURES OR HARDSCAPING. COVER BACKFLOW ASSEMBLY WITH POLAR BLANKET TO PREVENT FREEZE DAMAGE.
2. ENCLOSE ENTIRE BACKFLOW DEVICE WITH STRONG BOX BC-45-CR OR APPROVED EQUAL.
3. WHEN UNIT IS NEXT TO A STRUCTURE (I.E. WALL, BUILDING, ETC.) MOUNT TEST COCKS ON OPEN OR NON STRUCTURE SIDE.

BACKFLOW PREVENTER ASSEMBLY DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: LS-13 COUNCIL APPROVAL DATE DATE 03/26/2018

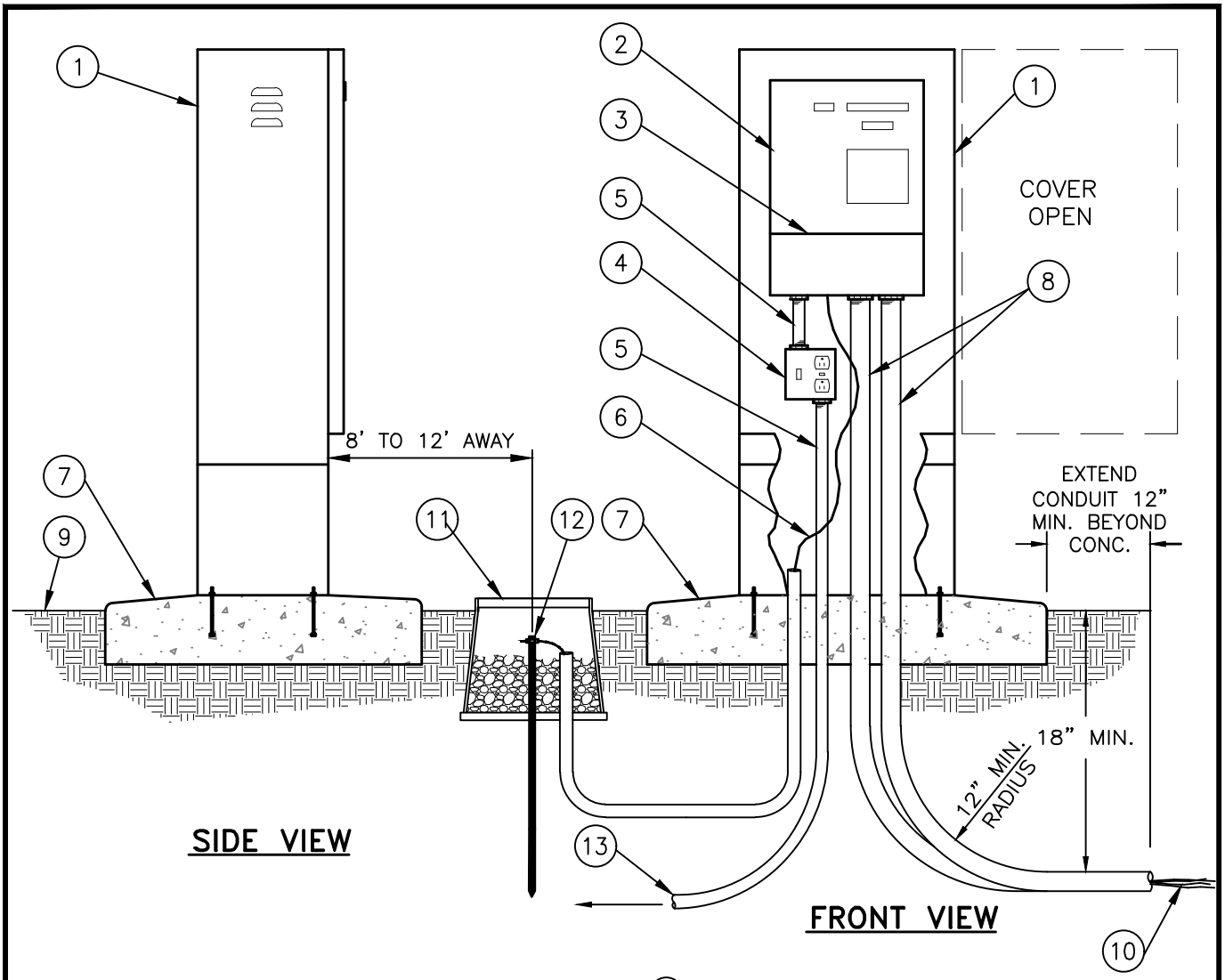


1. STRONGBOX STAINLESS STEEL NEMA 3R RAINPROOF ENCLOSURE (UL LISTED).
2. SATELLITE ASSEMBLY. ASSEMBLED IN ENCLOSURE BY SITEONE GREENTECH.
3. TERMINAL STRIP FOR VALVE WIRES.
4. POWER SWITCH/GFCI RECEPTACLE.
5. ELECTRICAL FLEX CONDUIT FOR POWER.
6. 6" MIN THICK, CONCRETE PAD WITH ANCHOR BOLTS PER MANUFACTURER RECOMMENDATIONS.
7. FINISHED GRADE.
8. FLOW SENSOR TERMINAL BOARD.
9. 1" CONDUIT AND SWEEP ELL WITH FLOW SENSOR CABLE.
10. 3" CONDUIT AND SWEEP ELL FOR LEAD WIRES.
11. 1" CONDUIT AND SWEEP ELL FOR MASTER VALVE WIRES.
12. 1" CONDUIT AND SWEEP ELL FOR 110 VAC POWER LINE.
13. 1" CONDUIT AND SWEEP ELL FOR GROUND WIRE.
14. 10" ROUND VALVE BOX AROUND GROUND ROD. FILL WITH 3/4" CRUSHED ROCK.
15. 5/8"x8' GROUND ROD WITH #6 GROUND WIRE AND CLAMP. LOCATE 8'-12' FROM ENCLOSURE.
16. #6 GROUND WIRE SECURED TO BACKBOARD GROUNDING TERMINAL.

NOTE: SEE IRRIGATION LEGEND CALL OUT FOR INCLUDED SATELLITE COMMUNICATION COMPONENTS. SUGGESTED CONDUIT SIZES MAY NEED TO BE LARGER.

CENTERILIZED CONTROLLER ASSEMBLY INSTALLATION

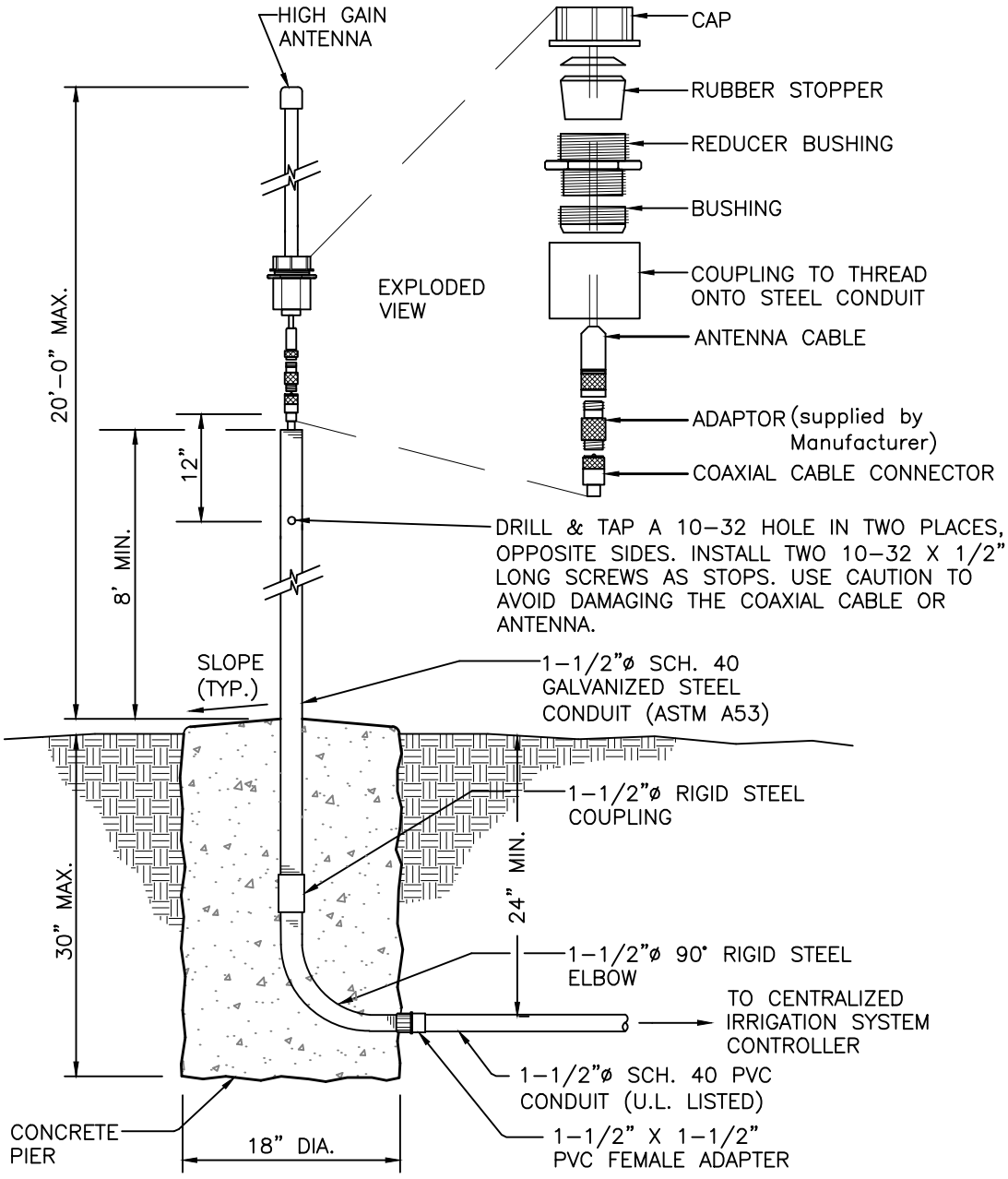
CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: LS-14 COUNCIL APPROVAL DATE DATE 03/26/2018



1. STAINLESS STEEL NEMA 3R, LOCKABLE, RAINPROOF ENCLOSURE (UL LISTED).
2. IRRIGATION CONTROLLER. MOUNT TO HOUSING PER MANUFACTURER'S RECOMMENDATIONS. LOCATE AS CLOSE AS POSSIBLE TO WALL OR STRUCTURE WHERE AVAILABLE.
3. TERMINAL STRIP FOR VALVE WIRES.
4. POWER SWITCH/GFCI RECEPTACLE.
5. 3/4"ø SCH. 40 PVC ELECTRICAL CONDUIT.
6. #8 AWG BARE COPPER WIRE FROM CONTROLLER GROUND TO GROUNDING ROD.
7. 6" MIN THICK, CONCRETE PAD WITH ANCHOR BOLTS PER MANUFACTURER RECOMMENDATIONS.
8. 2"ø SCH. 40 PVC ELECTRICAL CONDUIT.
9. FINISHED GRADE.
10. LOW-VOLTAGE CONTROLLER WIRES.
11. 10" ROUND VALVE BOX AROUND GROUND ROD. FILL WITH 3/4" CRUSHED ROCK.
12. 5/8"x8' GROUND ROD WITH #6 GROUND WIRE AND CLAMP. LOCATE 8'-12' FROM ENCLOSURE.
13. 3/4" CONDUIT AND SWEEP ELL FOR 110 VAC POWER LINE.

STANDARD CONTROLLER ASSEMBLY

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS-15
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



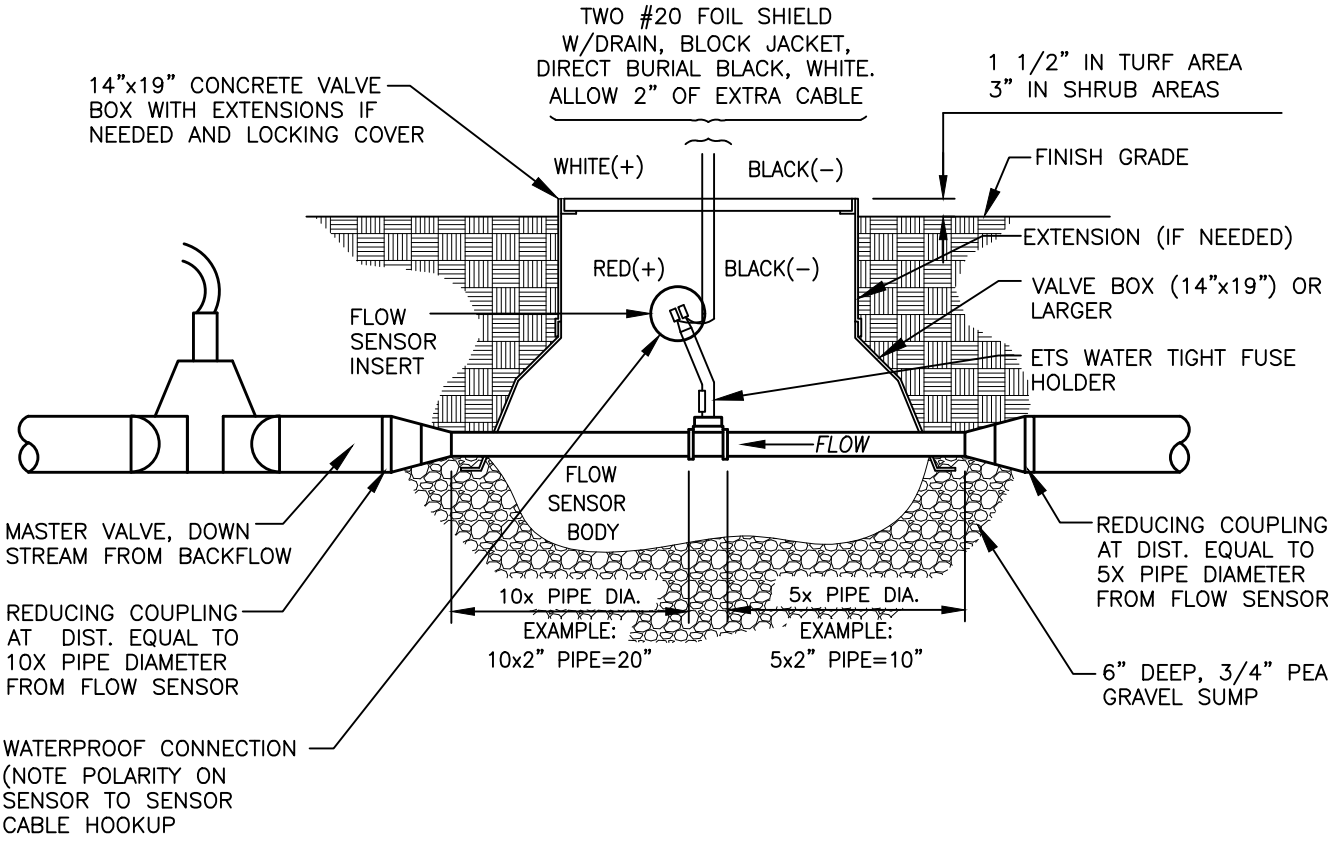
NOTE: COORDINATE FINAL LOCATION AND HEIGHT WITH THE ENGINEERING DIVISION PRIOR TO INSTALLATION.

CENTRALIZED CONTROLLER HIGH ANTENNA ASSEMBLY

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS-16
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

LOSCO REDUCING COUPLINGS ARE AVAILABLE IN THE FOLLOWING SIZES AND PART NUMBERS:

429-585	8"x6"
429-532	5"x4"
429-422	4"x3"
429-338	3"x2"
429-251	2"x1 1/2"
429-212	1 1/2"x1 1/4"
429-168	1 1/4"x1"

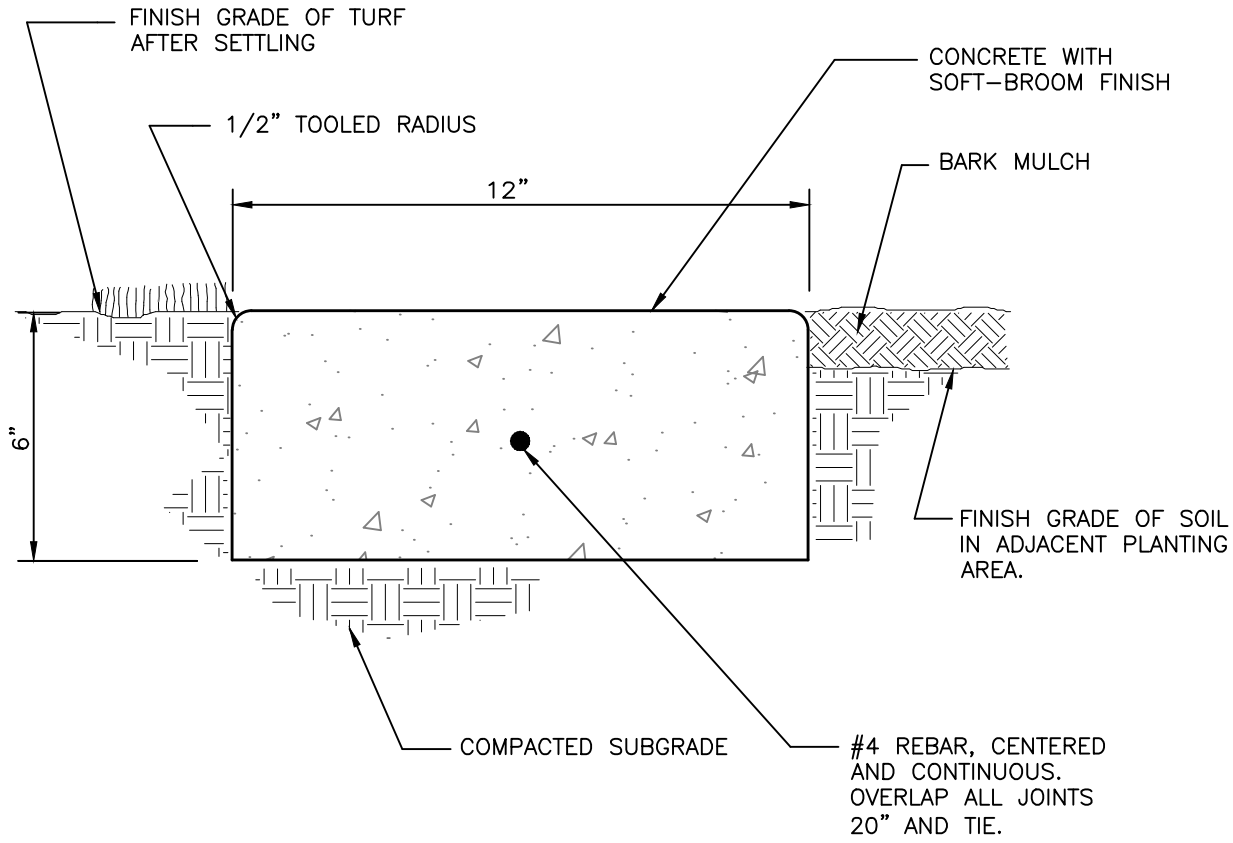


NOTES:

1. FLOW SENSOR MUST BE INSTALLED WITH INSERT (TOP) POSITIONED VERTICALLY AND BODY (TEE) POSITIONED HORIZONTALLY.
2. FLOW SENSOR CABLE MUST BE RUN IN 1" CONDUIT FROM FLOW SENSOR TO CONTROLLER ENCLOSURE.

MASTER VALVE/FLOW SENSOR

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: LS-17
CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



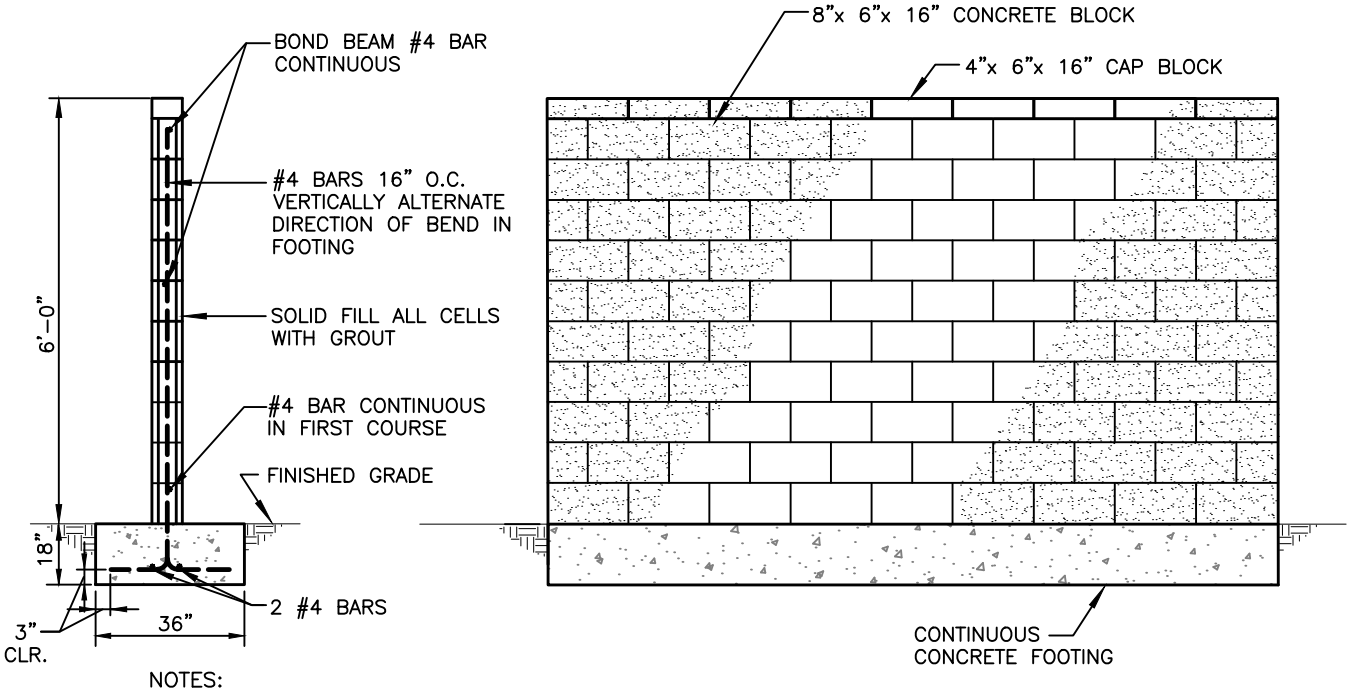
%%UNOTE: PROVIDE 1/4" WIDE BY 1/2" DEEP SCORE LINES AT 8'-0" O.C. AND EXPANSION JOINTS AT 32'-0" O.C.

CONCRETE MOW STRIP DETAIL

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: LS-18
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

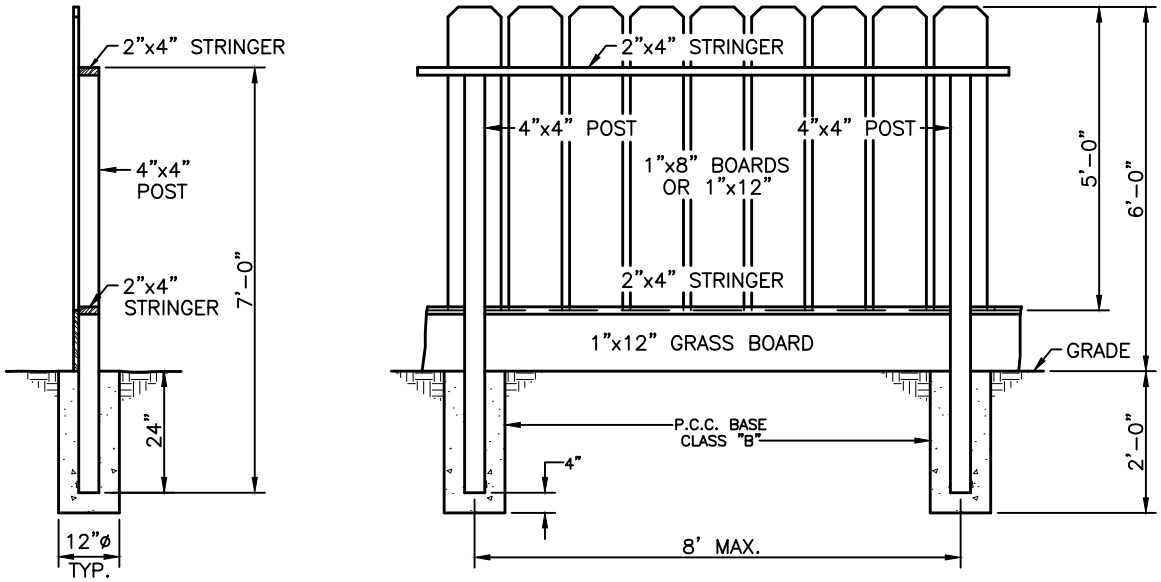
FENCING



NOTES:

1. LAP ALL STEEL SPLICES 12" MIN. OR ACCORDING TO ACI 318 WHICH EVER IS GREATER
2. MASONRY MAY REQUIRE 50 BAR DIAMETERS.
3. SPLIT FACE, ADOBE COLOR MASONRY BLOCK, MATCHING MORTAR. SPLIT FACE TO BE PLACED FACING PROPOSED EXPRESSWAY

ACCESS CONTROL FENCE

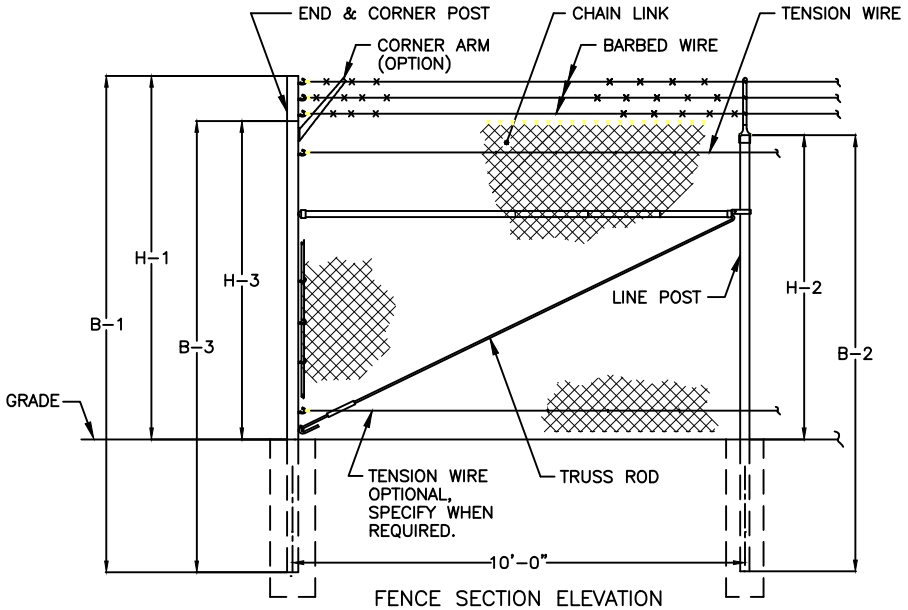


NOTE: ALL MATERIAL TO BE CEDAR OR REDWOOD.

SCREEN FENCE

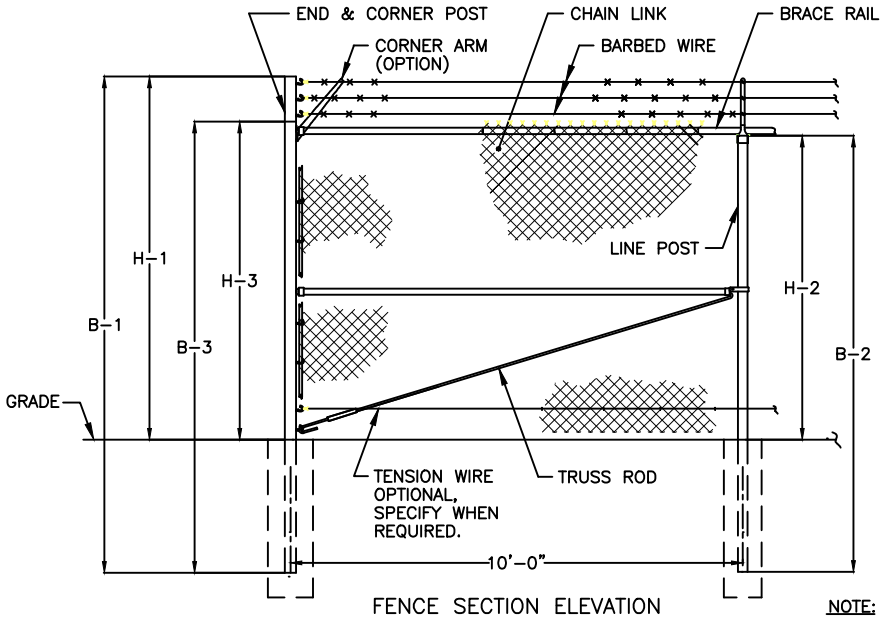
STANDARD FENCE DETAILS

PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: F-1
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018



FENCE SECTION ELEVATION

WITHOUT TOP RAIL & WITH BARBED WIRE



FENCE SECTION ELEVATION

WITH TOP RAIL & WITH BARBED WIRE

NOTE:

FOR FOOTING SEE SPECIFICATIONS SHEET F–xx

FENCE HEIGHT	UPRIGHT END & CORNER POSTS		LINE POSTS		CORNER POSTS WITH CORNER ARM	
NOM HT INCLUDING BARBED WIRE	B–1 BAR LENGTH	H–1 HEIGHT ABOVE GRADE	B–2 BAR LENGTH	H–2 HEIGHT ABOVE GRADE	B–3 BAR LENGTH	H–3 HEIGHT ABOVE GRADE
7'–0"	10'–0"	7'–0 5/8"	8'–8"	5'–8 7/8"	9'–0"	6'–0 5/8"
8'–0"	11'–0"	8'–0 5/8"	9'–8"	6'–8 7/8"	10'–0"	7'–0 5/8"
9'–0"	12'–0"	9'–0 5/8"	10'–8"	7'–8 7/8"	11'–0"	8'–0 5/8"
10'–0"	13'–0"	10'–0 5/8"	11'–8"	8'–8 7/8"	12'–0"	9'–0 5/8"
11'–0"	14'–0"	11'–0 5/8"	12'–8"	9'–8 7/8"	13'–0"	10'–0 5/8"
12'–0"	15'–0"	12'–0 5/8"	13'–8"	10'–8 7/8"	14'–0"	11'–0 5/8"

TYPICAL FENCE WITH BARBED WIRES

PREPARED BY: SER

CHECKED BY: DRJ

SCALE: NONE

CITY OF CERES

ENGINEERING DEPARTMENT

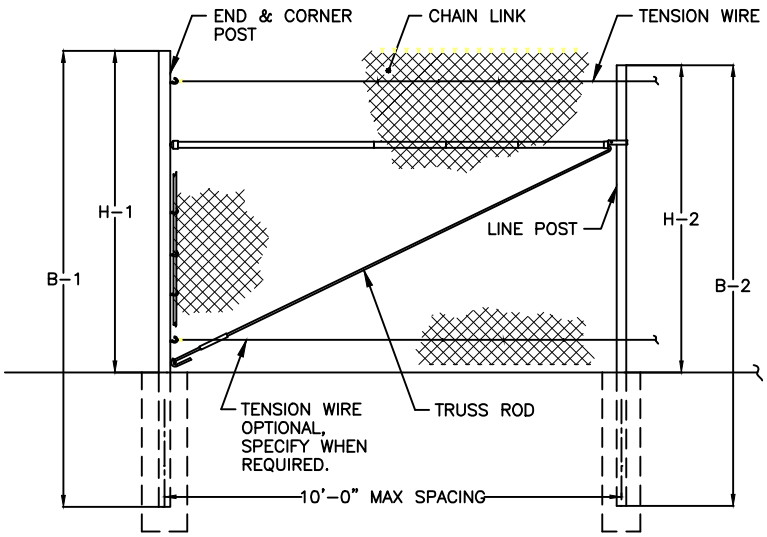
APPROVED BY

CITY ENGINEER – DARYL JORDAN – RCE 58036

PLATE NO: F–2

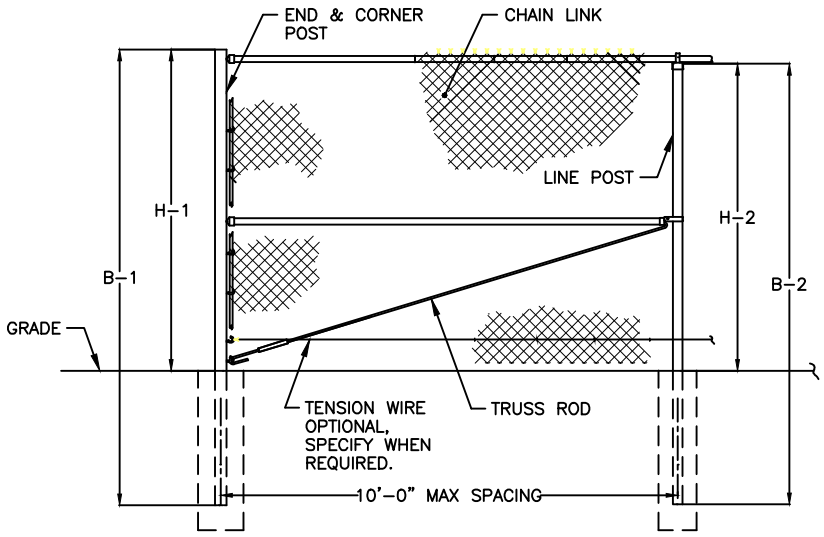
COUNCIL APPROVAL DATE

DATE 03/26/2018



FENCE SECTION ELEVATION

WITHOUT TOP RAIL & WITHOUT BARBED WIRE



FENCE SECTION ELEVATION

WITH TOP RAIL & WITHOUT BARBED WIRE

NOTE:
FOR FOOTING SEE SPECIFICATIONS SHEET F-XX

FENCE HEIGHT	END & CORNER POSTS		LINE POSTS	
NOMINAL HEIGHT	B-1 BAR LENGTH	H-1 HEIGHT ABOVE GRADE	B-2 BAR LENGTH	H-2 HEIGHT ABOVE GRADE
5'-0"	8'-0"	5'-0 5/8"	7'-8"	4'-8 7/8"
6'-0"	9'-0"	6'-0 5/8"	8'-8"	5'-8 7/8"
7'-0"	10'-0"	7'-0 5/8"	9'-8"	6'-8 7/8"
8'-0"	11'-0"	8'-0 5/8"	10'-8"	7'-8 7/8"
9'-0"	12'-0"	9'-0 5/8"	11'-8"	8'-8 7/8"
10'-0"	13'-0"	10'-0 5/8"	12'-8"	9'-8 7/8"
11'-0"	14'-0"	11'-0 5/8"	13'-8"	10'-8 7/8"
12'-0"	15'-0"	12'-0 5/8"	14'-8"	11'-8 7/8"

TYPICAL HIGH FENCE WITHOUT BARBED WIRE

PREPARED BY: SER

CHECKED BY: DRJ

SCALE: NONE

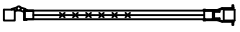
CITY OF CERES
ENGINEERING DEPARTMENT

APPROVED BY

CITY ENGINEER – DARYL JORDAN – RCE 58036

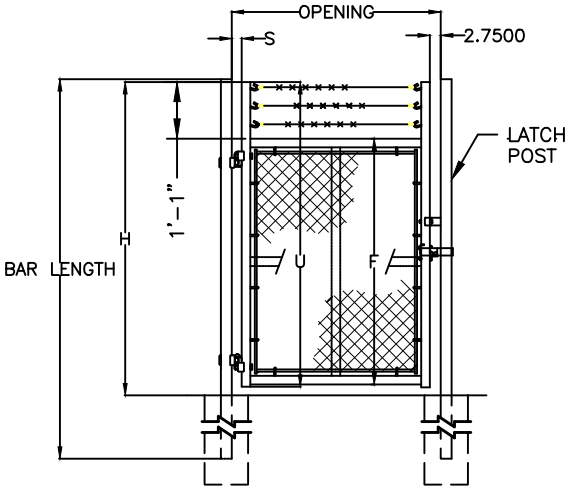
PLATE NO: F-3

COUNCIL APPROVAL DATE
DATE 03/26/2018

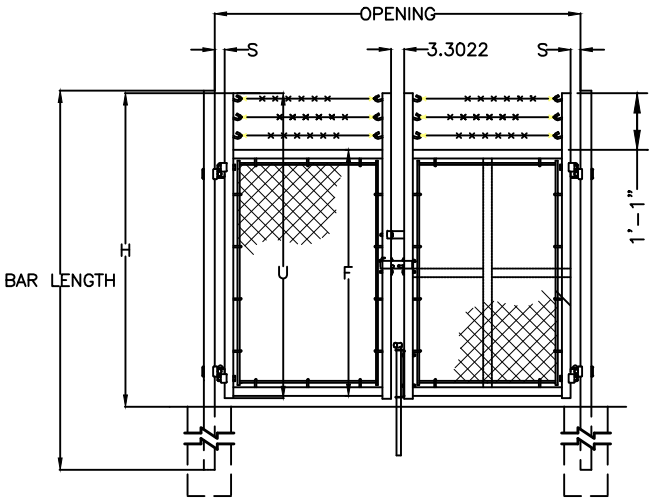


SINGLE GATE PLAN

DOUBLE GATE PLAN



SINGLE GATE ELEVATION



DOUBLE GATE ELEVATION

NOTE:
FOR FOOTING SEE SPECIFICATIONS SHEET F-3

SINGLE OR DOUBLE LEAF GATES		
NOM HEIGHT (H)	UPRIGHT HT (U)	FRAME HT (F)
NOM HT INCLUDING BARBED WIRE	ACTUAL DIM	ACTUAL DIM
7'-0"	6'-10"	5'-8 1/2"
8'-0"	7'-10"	6'-8 1/2"
9'-0"	8'-10"	7'-8 1/2"
10'-0"	9'-10"	8'-8 1/2"
11'-0"	10'-10"	9'-8 1/2"
12'-0"	11'-10"	10'-8 1/2"
13'-0"	12'-10"	11'-8 1/2"

SINGLE LEAF GATES		
OPENING	GATE POSTS	HINGE SPACE (S)
FACE TO FACE	SQ & RND SIZES	POST TO UPRIGHT
3'-0" THROUGH 6'-0"	2 1/2" SQ OR 2.875" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
7'-0" THROUGH 10'-0"	3" SQ OR 4" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
11'-0" THROUGH 12'-0"	4" SQ OR 4" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
13'-0" THROUGH 18'-0"	6" SQ OR 6.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"
19'-0" THROUGH 20'-0"	8" SQ OR 8.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"

DOUBLE LEAF GATES		
OPENING	GATE POSTS	HINGE SPACE (S)
FACE TO FACE	SQ & RND SIZES	POST TO UPRIGHT
8'-0" THROUGH 12'-0"	2 1/2" SQ OR 2.875" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
14'-0" THROUGH 24'-0"	3" SQ OR 4" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
26'-0" THROUGH 36'-0"	6" SQ OR 6.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"
38'-0" THROUGH 40'-0"	8" SQ OR 8.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"

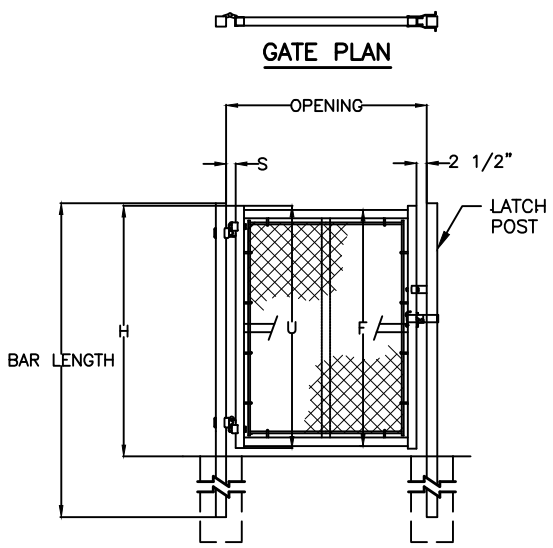
NOTE:
CENTER UPRIGHT REQUIRED ON GATE LEAVES 8'-0" & WIDER. CENTER RAIL REQUIRED ON GATE LEAVES 10'-0" & HIGHER.

TYPICAL SWING GATES WITH BARBED WIRE

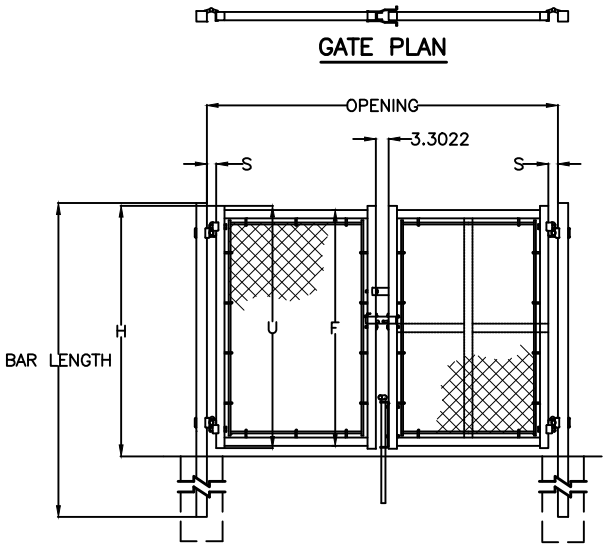
PREPARED BY: SER
CHECKED BY: DRJ
SCALE: NONE

CITY OF CERES
ENGINEERING DEPARTMENT
APPROVED BY
CITY ENGINEER – DARYL JORDAN – RCE 58036

PLATE NO: F-4
COUNCIL APPROVAL DATE
DATE 03/26/2018



SINGLE GATE ELEVATION



DOUBLE GATE ELEVATION

NOTE:
FOR FOOTING SEE SPECIFICATIONS SHEET F-xx

SINGLE OR DOUBLE LEAF GATES		
NOM HEIGHT (H)	UPRIGHT HT (U)	FRAME HT (F)
WITHOUT BARBED WIRE	ACTUAL DIM	ACTUAL DIM
3'-0"	2'-10"	2'-8 1/2"
3'-6"	3'-4"	3'-2 1/2"
4'-0"	3'-10"	3'-8 1/2"
5'-0"	4'-10"	4'-8 1/2"
6'-0"	5'-10"	5'-8 1/2"
7'-0"	6'-10"	6'-8 1/2"
8'-0"	7'-10"	7'-8 1/2"
9'-0"	8'-10"	8'-8 1/2"
10'-0"	9'-10"	9'-8 1/2"
11'-0"	10'-10"	10'-8 1/2"
12'-0"	11'-10"	11'-8 1/2"

SINGLE LEAF GATES		
OPENING	GATE POSTS	HINGE SPACE (S)
FACE TO FACE	SQ & RND SIZES	POST TO UPRIGHT
3'-0" THROUGH 6'-0"	2 1/2" SQ OR 2.875" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
7'-0" THROUGH 10'-0"	3" SQ OR 4" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
11'-0" THROUGH 12'-0"	4" SQ OR 4" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
13'-0" THROUGH 18'-0"	6" SQ OR 6.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"
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DOUBLE LEAF GATES		
OPENING	GATE POSTS	HINGE SPACE (S)
FACE TO FACE	SQ & RND SIZES	POST TO UPRIGHT
8'-0" THROUGH 12'-0"	2 1/2" SQ OR 2.875" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
14'-0" THROUGH 24'-0"	3" SQ OR 4" OD	FOR SQUARE & ROUND GATE POSTS: 2 1/4"
26'-0" THROUGH 36'-0"	6" SQ OR 6.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"
38'-0" THROUGH 40'-0"	8" SQ OR 8.625" OD	FOR GATE POSTS: SQ-2 1/4" RND-3 1/2"

NOTE:
CENTER UPRIGHT REQUIRED ON GATE LEAVES 8'-0" & WIDER. CENTER RAIL REQUIRED ON GATE LEAVES 10'-0" & HIGHER.

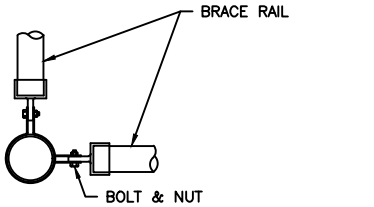
TYPICAL SWING GATES WITHOUT BARBED WIRE

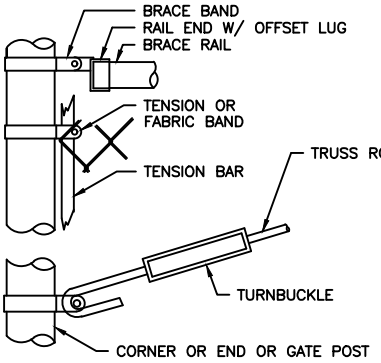
PREPARED BY: SER
CHECKED BY: DRJ
SCALE: NONE

CITY OF CERES
ENGINEERING DEPARTMENT
APPROVED BY
CITY ENGINEER – DARYL JORDAN – RCE 58036

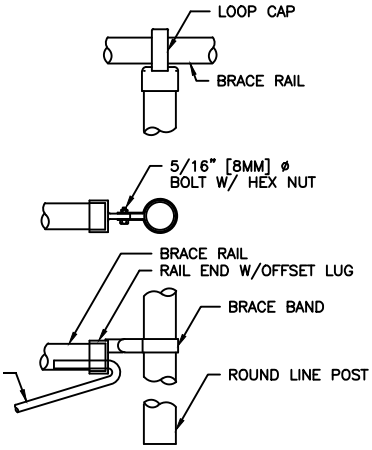
PLATE NO: F-5
COUNCIL APPROVAL DATE
DATE 03/26/2018

ROUND TERMINAL POSTS

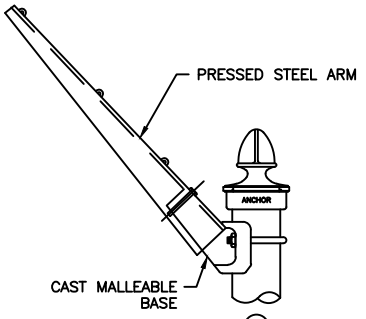




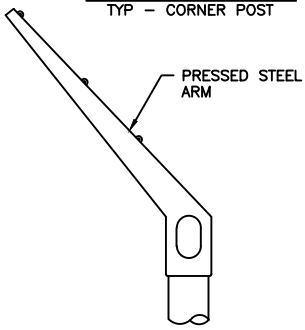
Ⓐ END, CORNER, OR GATE POST ELEVATION



Ⓑ LINE POST ELEVATION

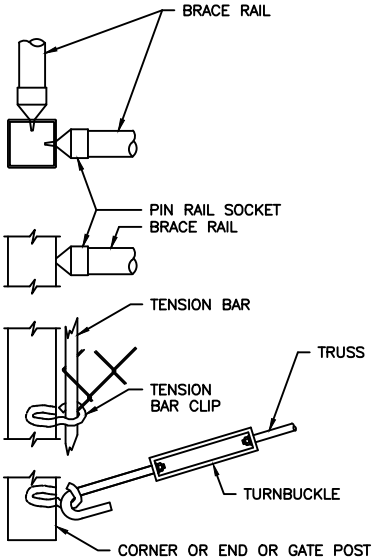


Ⓓ BARBED WIRE CORNER ARM TYP – CORNER POST

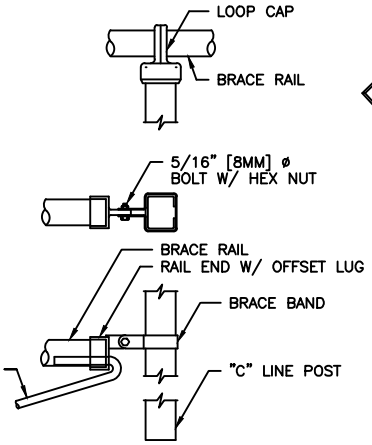


Ⓒ BARBED WIRE 45° ARM TYP – LINE POST

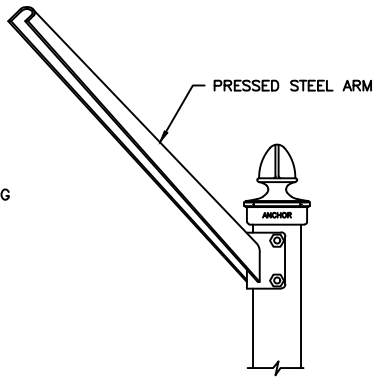
SQUARE TERMINAL POSTS



Ⓐ END, CORNER, OR GATE POST ELEVATION

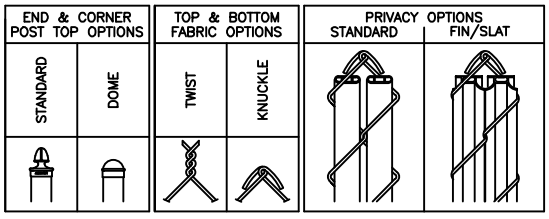


Ⓑ LINE POST ELEVATION



Ⓒ BARBED WIRE CORNER ARM TYP – CORNER POST

PRIVACY SLATS NOTE: ALL SLATS SHALL BE MANUFACTURED FROM A COMBINATION OF COLOR PIGMENTS, QUALITY HIGH DENSITY VIRGIN POLYETHYLENE AND ULTRAVIOLET INHIBITORS.

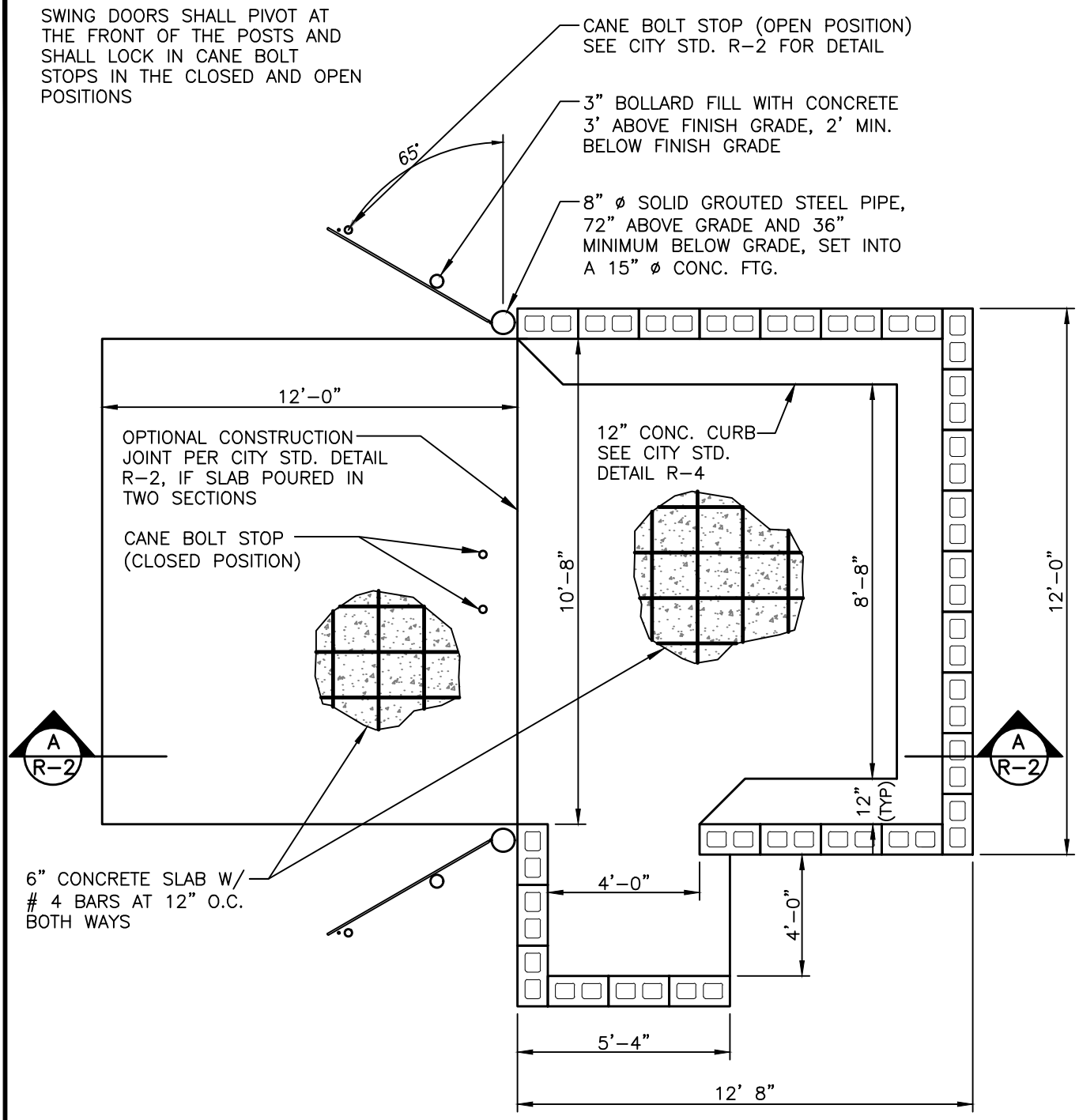


TYPICAL ROUND & SQUARE FENCE POST DETAILS

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: F–6 COUNCIL APPROVAL DATE DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

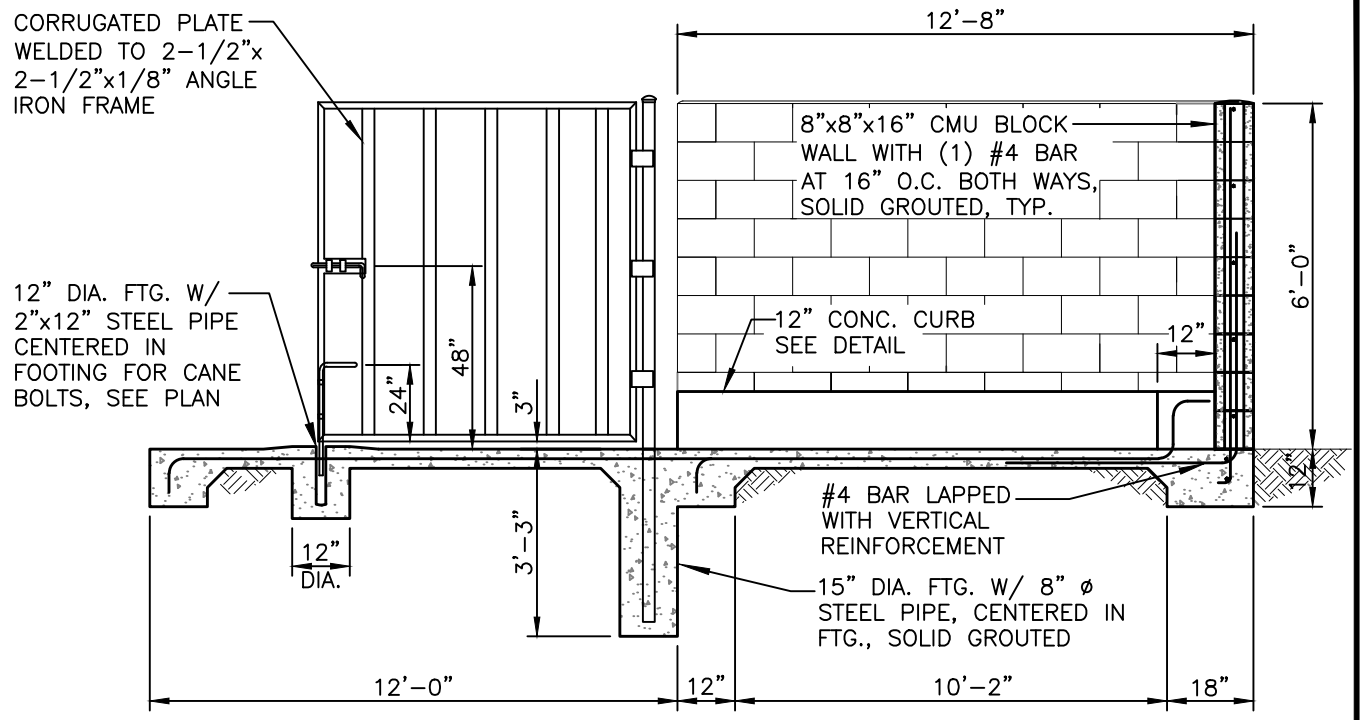
REFUSE



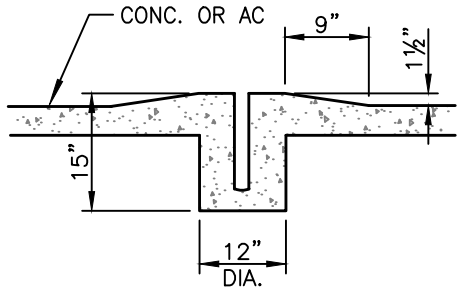
NOTES:
1. LAP ALL STEEL SPLICES 12" MIN.
2. MAINTAIN 3" CLEARANCE WHEN REBAR IS USED FOR REINFORCING CONC.
3. PROVIDE 3" INSIDE RADIUS BEND FOR #4 REBARS.
4. SEE CITY STANDARD R-2 FOR DETAILS NOT SHOWN

REFUSE & RECYCLE BIN ENCLOSURE

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: R-1 COUNCIL APPROVAL DATE DATE 03/26/2018

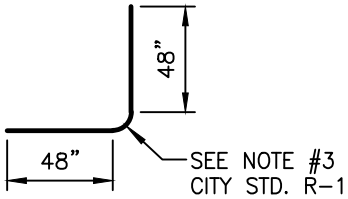


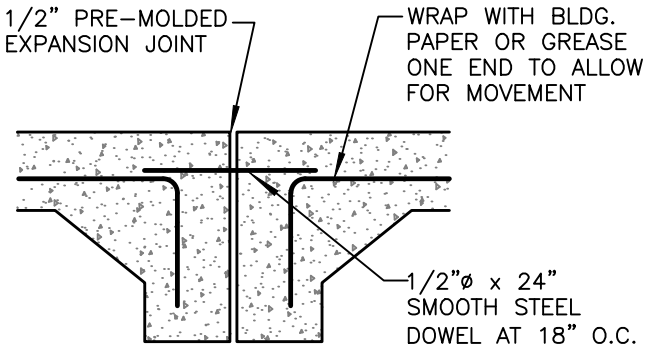
SECTION A-A



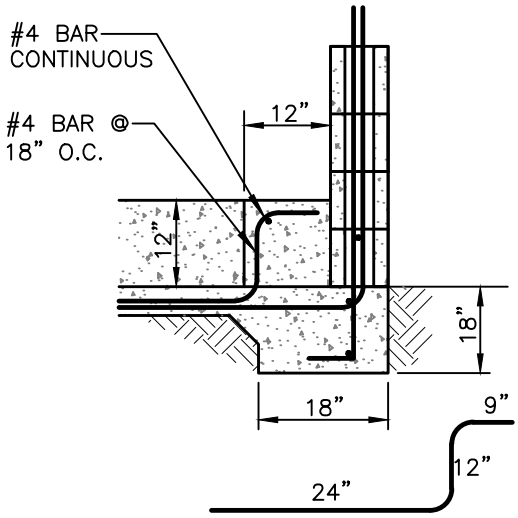
CANE BOLT STOP DETAIL

SEE DRAWING NO. R-1 FOR NOTES





DOWELING DETAIL



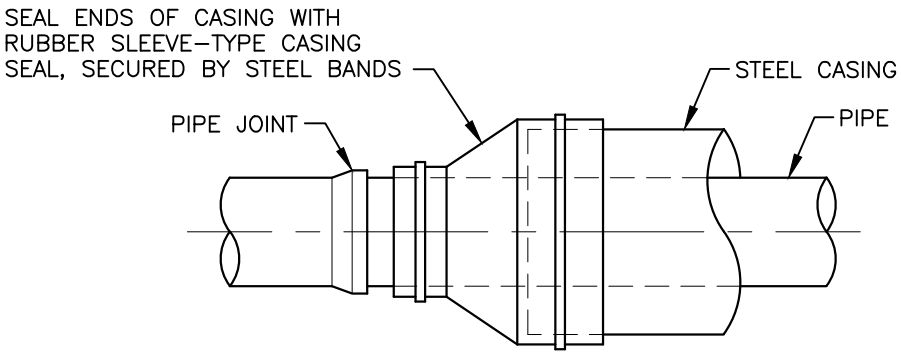
12" RAISED CURB DETAIL

REFUSE & RECYCLE BIN ENCLOSURE DETAILS

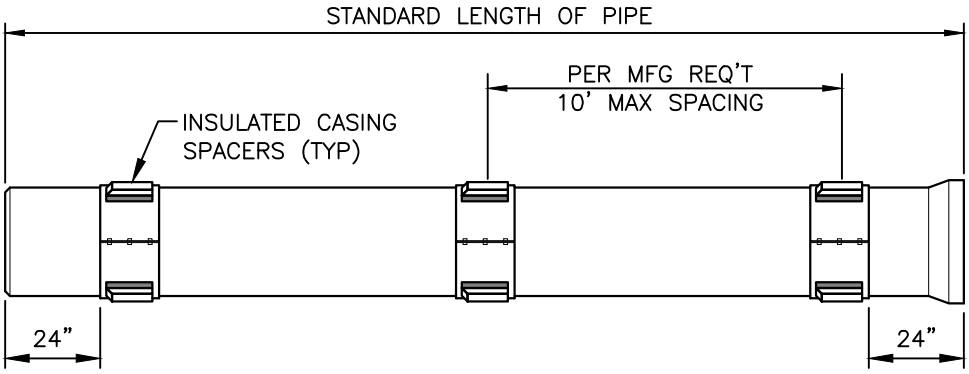
PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT		PLATE NO: R-2
CHECKED BY: DRJ	APPROVED BY		COUNCIL APPROVAL DATE
SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036		DATE 03/26/2018

CITY OF CERES
STANDARD DESIGNS

MISCELLANEOUS

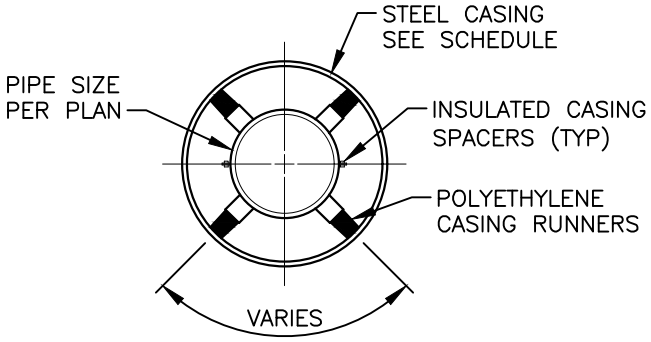


CASING CLOSURE



ELEVATION

STEEL CASING SCHEDULE		
PIPE SIZE	CASING	THICKNESS
6" C–900 PIPE	12" I.D.	3/16"
8" C–900 PIPE	16" I.D.	1/4"
10" C–900 PIPE	18" I.D.	1/4"
12" C–900 PIPE	20" I.D.	1/4"
6" V.C.P.	14" I.D.	3/16"
8" V.C.P.	16" I.D.	1/4"
10" V.C.P.	20" I.D.	1/4"
12" V.C.P.	22" I.D.	1/4"
15" V.C.P.	26" I.D.	1/4"

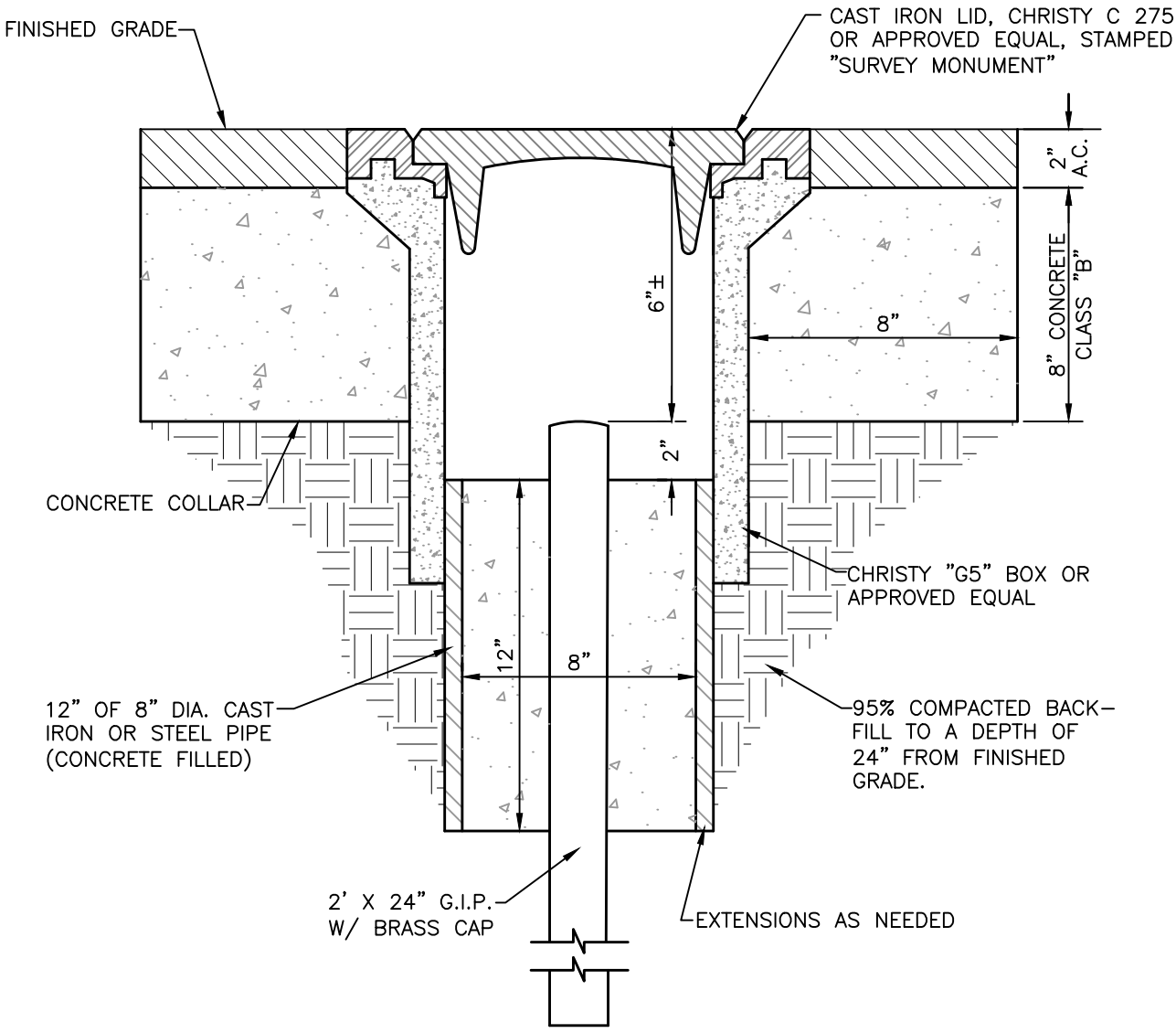


SECTION

NOTES:
1. CASING SHALL BE INSTALLED BY THE JACKING OR BORING METHOD.
2. CASING SHALL BE EITHER WELDED OR RIVETED TYPE.
3. INSULATED CASING SPACERS SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
4. REDWOOD SKIDS ARE TYPICALLY NOT ALLOWED, UNLESS APPROVED BY THE ENGINEER.
5. SAND FILL FOR CASING IS NOT REQUIRED, UNLESS REDWOOD SKIDS ARE USED.

BORING STANDARD

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: M–1
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



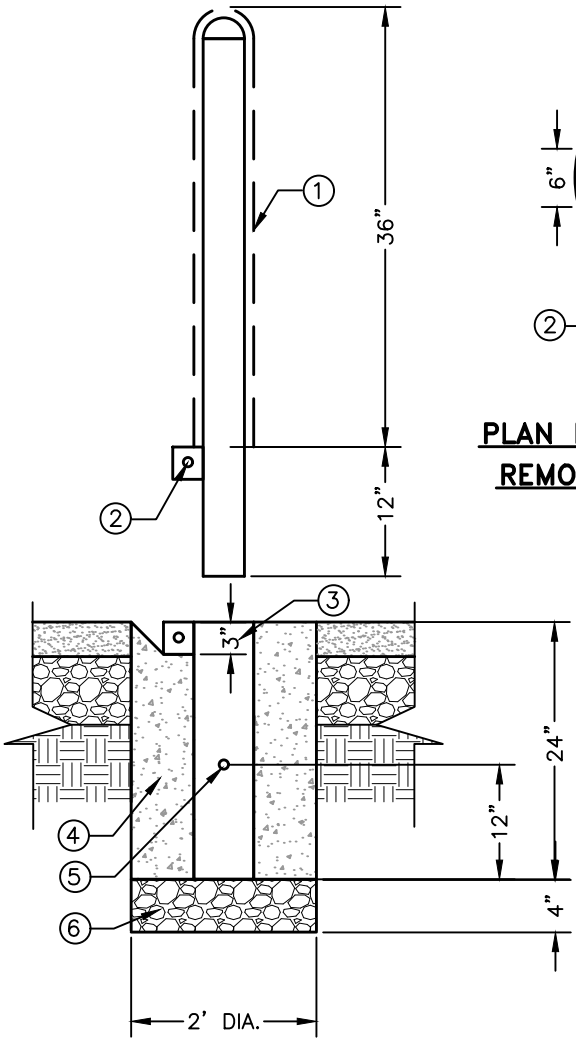
SECTION

NOTES:

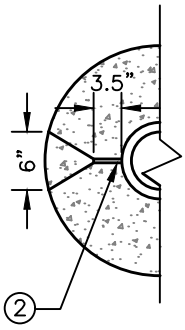
1. MONUMENT BOXES SHALL BE CHRISTY G5 WITH CHRISTY IRON COVER OR APPROVED EQUAL.
2. SET MONUMENT BOX TO FINISH GRADE.
3. COMPACT EARTH AROUND BASE WITH MECHANICAL TAMPER TO 95% RELATIVE COMPACTION AND ENCASE IN 8" OF CONCRETE.
4. AFTER CONCRETE SETS, PATCH WITH 2" A.C.
5. IN TRAFFIC AREAS, CONCRETE SHALL BE MADE WITH TYPE III HIGH EARLY STRENGTH CEMENT. BARRICADES SHALL BE REMOVED IN 24 HOURS.

SURVEY MONUMENT

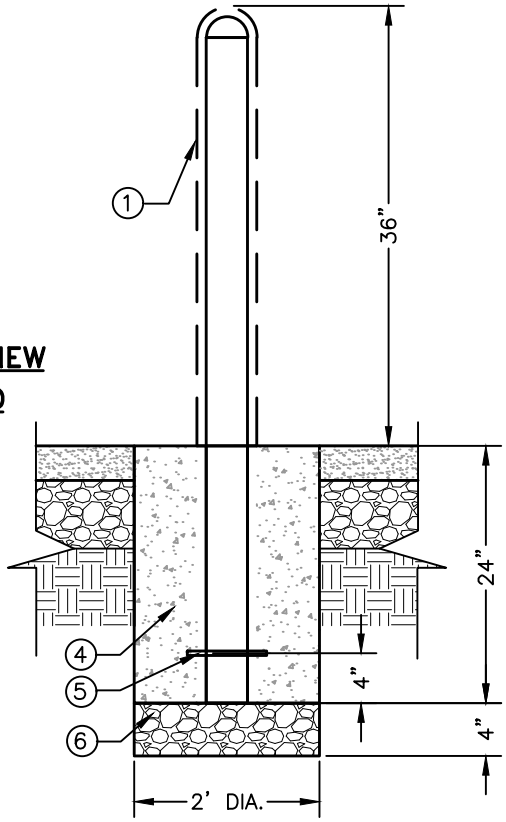
	PREPARED BY: SER	CITY OF CERES ENGINEERING DEPARTMENT	PLATE NO: M-2
	CHECKED BY: DRJ	APPROVED BY	COUNCIL APPROVAL DATE
	SCALE: NONE	CITY ENGINEER – DARYL JORDAN – RCE 58036	DATE 03/26/2018



REMOVABLE BOLLARD



PLAN INSERT PLAN VIEW REMOVABLE BOLLARD



PERMANENT BOLLARD

GENERAL NOTES

4" SCHEDULE 40 STEEL BOLLARD WITH 6" PLASTIC SLEEVE– IDEAL SHIELD MODEL # ARCH–CC–06–52–S, REMOVABLE EMBEDDED MOUNT, OR APPROVED EQUAL.

EMBEDDED SLEEVE IS SHOWN ABOVE GRADE FOR ILLUSTRATIVE PURPOSE. WHEN INSTALLED, SLEEVE WILL BE EMBEDDED SUCH THAT TOP OF SLEEVE IS FLUSH WITH THE GRADE.

LOCKING TABS ON BOTH SLEEVE AND BOLLARD ALLOW BOLLARD TO BE LOCKED USING CHAIN AND PADLOCKS APPROVED BY THE CITY

DETAIL NOTES

1. 6" PLASTIC BOLLARD SLEEVE.
2. LOCK TAB W/ $1\frac{1}{4}$" HOLE
3. GALVANIZED RECEIVER
4. CLASS "B" CONCRETE FOUNDATION
5. $\frac{1}{2}$" REBAR
6. GRAVEL FOR DRAINAGE

BOLLARD DETAIL

CITY OF CERES ★ TOGETHER WE ACHIEVE ★	PREPARED BY: SER CHECKED BY: DRJ SCALE: NONE	CITY OF CERES ENGINEERING DEPARTMENT APPROVED BY CITY ENGINEER – DARYL JORDAN – RCE 58036	PLATE NO: M–3 COUNCIL APPROVAL DATE DATE 03/26/2018